FIELD CROP ABSTRACTS

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REVIEW ARTICLE

FERTILIZER PLACEMENT FOR ARABLE AND HERBAGE CROPS

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INTRODUCTION

The value of localizing dressings of fertilizer in contact with, or close to, the seed of certain crops has been recognized for many years. Australian farmers secure good crops by applying small quantities of superphosphate with the seed of cereals. In the USA most row-crops have dressings of fertilizer placed in bands to the side of the seed. Initially, placement practices were adopted to save labour, but, more recently, it has been shown that they give improved yields.

In this country, until recently, fertilizer and seed were normally applied in two operations. During the war many combined seed and fertilizer drills were imported from Australia and the USA to cope with the increased arable acreage resulting from ploughing-up large areas of grassland. Much of the land ploughed was very phosphate-deficient and some was deficient in potash. On such fields there were marked benefits from combine-drilled dressings of phosphate and potash and higher yields were obtained than with equivalent broadcast dressings. As a result of this success from placed fertilizer, an extensive series of experiments was started to determine what benefits could be expected from special placement methods in this country. The results of this investigation are summarized first ; work in other countries has been summarized in the second part of this review.

FERTILIZER PLACEMENT EXPERIMENTS IN ENGLAND AND SCOTLAND

Cereals : Experiments on cereals were started in 1942 ; the results have been summarized by Crowther (1945). The experiments showed that combine-drilled dressings of superphosphate gave higher yields than equivalent broadcast dressings. On average, 1·5 cwt. of superphosphate per acre applied by combine-drill gave the same yield as 3 cwt. per acre broadcast over the seedbed. Crowther (1945) also states that similar benefits were obtained with combine-drilled dressings of muriate of potash on calcareous potash-deficient soils in Berkshire. At 1·5 cwt. per acre, muriate of potash combine-drilled was rather better than double the dressing broadcast on the seedbed. Preliminary experiments show that similar, though smaller, benefits are likely from combine-drilled dressings of nitrogen fertilizers (Rothamsted Experimental Station, 1954).

Potatoes : Two series of experiments have been reported. The first series compared alternative methods of applying fertilizers when potatoes were planted by hand (Cooke, 1949). Until recently the traditional method of planting potatoes in England was to open furrows, apply fertilizer over the ridges, plant the potatoes by hand, and then split the ridges to cover the seed. Under these conditions there was no benefit from special placement methods. National Compound Fertilizer No. 1 (7-7-10·5)* applied in side-bands below the level of the seed gave similar increases in yield to fertilizer broadcast over the ridges before planting. Fertilizer placed in a band directly beneath, or in contact with, the tuber, often checked growth and reduced yields in dry weather and on light soils. Where growth was not checked by dressings in contact, similar yields were obtained from contact and sideband placement. Fertilizer broadcast on the flat land before opening the furrows was of less value and 15 cwt. per acre applied in this way gave the same yield as only 10 cwt. per acre broadcast over the ridges. Thus, when potatoes were planted by hand, there was no need for expensive machinery to apply fertilizer in sidebands ; the best method was to broadcast the dressings over the ridged land so that fertilizer was concentrated in the centre of the final ridge when the potatoes were covered.

Recent surveys of potato-growing by Boyd and Dyke (1950) showed that an increasing proportion of the acreage was being planted by machine. It is believed that, in 1952, half of the acreage was planted by machine and that this proportion is increasing. When potatoes are planted by machines there is no opportunity to broadcast fertilizer over the ridges since the machines normally work on flat land, and plant the potatoes and form the ridge in one operation. Unless planters are fitted with fertilizer attachments there is no alternative to broadcasting over the seedbed before planting.

* Fertilizer analyses are given here in abbreviated form, thus 7-7-10.5 implies a fertilizer containing 7% N, 7% P_2O_5, 10.5% K_2O.

An investigation was started in 1951 to determine the most efficient method of applying fertilizer for machine-planted potatoes (Cooke, Jackson and Widdowson, 1954). Thirty-three experiments were carried out on many different kinds of soil. The experiments compared single sideband placement (taken as a standard) with : contact placement, broadcasting over the ploughed land, broadcasting over the seedbed and broadcasting half and applying the remainder of the dressing in contact with the seed. Fertilizer was applied at two rates : 7·5 and 15 cwt. per acre.

There was little difference between the yields of potatoes given by 15 cwt. per acre of National Compound Fertilizer No. 1 whether broadcast over the ploughed land (and therefore worked in deeply) or broadcast on the seedbed immediately before planting. There was also little difference between the yields given by contact and sideband placement on average of all the experiments and of the two rates of dressing, but contact placement at the high rate reduced yields at several centres. Observations in the early part of the growing season showed that contact placement generally delayed emergence by 7-10 days. At some light-land centres growth was checked more severely and emergence was delayed by as much as three weeks ; plant establishment was reduced and yields were lower. In general, 10 cwt. per acre of fertilizer placed in one sideband three inches to the side of the seed gave the same yield as 15 cwt. per acre broadcast over the seedbed.

Peas and beans : Many farmers drilled fertilizer with the seed of peas and beans and obtained variable results largely depending upon the type of weather following drilling. When rain followed sowing, excellent crops of peas were grown in this way, but, in drier springs, germination was often reduced and occasionally the crop failed completely.

The earlier experiments on peas were planned to develop safe methods of placing fertilizer. Cooke (1949) showed that placing PK fertilizers such as 0-10-20 and 0-14-14 in contact with, or directly below the seed, was liable to reduce plant establishment seriously. Comparisons between a single sideband placed either 1 in. or 3 in. to the side of the seed and approximately 3 in. below the soil surface showed that a distance of 1 in. was too close to the seed for safety and that 3 in. was too far away. A standard placement position was therefore adopted and in all subsequent experiments fertilizer was placed in a band 2 in. to the side of the seed. Assessments of plant establishment were made for each experiment. Plant population was not reduced by sideband placement at any centre, and, on average, placement gave a slightly higher population than broadcasting.

The Rothamsted experiments on threshed peas were carried out from 1947-50 (Cooke, 1949), (Cooke and Widdowson, 1953), and the work was, in later years, extended to peas picked green for market. Higher yields were obtained from placed than from broadcast dressings. On the average of all the experiments 3 cwt. per acre of a PK compound placed 2 in. to the side of the seed gave higher yields than 6 cwt. per acre broadcast over the seedbed. Broadcast dressings generally resulted in a financial loss to the farmer but placed dressings were very profitable.

Comparisons were also made between broadcasting at two stages in the preparation of the seedbed. Dressings broadcast over the ploughed land, and subsequently worked well into the seedbed by cultivations, were generally of more value than equivalent dressings broadcast immediately before drilling. There was no worthwhile advantage from broadcasting half the fertilizer dressing and placing the remainder.

The work on both threshed peas and green peas was extended to other parts of the Eastern Counties of England in 1950-3. The results which have been reported (Cooke and Dadd, 1953), (Bullen, Dadd and Cooke, 1954) confirm the value of placement demonstrated in the Rothamsted work.

Similar experiments (Cooke, Jackson and Widdowson, 1954) were carried out on winter- and spring-sown beans. Higher yields were obtained from fertilizer placed to the side of the seed than from broadcast fertilizer. The increases from placement were sufficient to yield a good profit from the outlay on fertilizer but heavy broadcast dressings gave increases which were not economic. Spring beans showed similar benefits from placement, but broadcast dressings were of little value.

These experiments on beans also compared early broadcasting of the fertilizer (before preparing the seedbed) with broadcasting on the seedbed immediately before sowing. Seedbed dressings increased yields somewhat, but early dressings produced higher yields. Seedbed dressings had very little effect upon the yield of spring beans but dressings broadcast over the ploughed land and worked in deeply by seedbed preparations increased yields appreciably.

Horticultural crops : Recent experiments (Rothamsted Experimental Station, 1954) have shown that gains in yield and earlier maturity are obtained by placing dressings of fertilizer to the side of the seed of many horticultural crops. Comparisons were made between broadcasting and placing dressings of National Compound Fertilizer No. 1 ; the experiments were on ordinary arable land.

Rapid early development was promoted by placing fertilizer dressings near the seed. Lettuce, cabbage and both runner and broad beans on plots having placed fertilizer were ready to harvest before crops receiving broadcast fertilizer. Early

maturity of this nature may be highly profitable to growers.

All crops, except French beans, gave markedly higher yields from placed than from broadcast dressings. For many crops 2·5 cwt. per acre of 7-7-10·5 fertilizer placed gave higher yields than 5 cwt. per acre broadcast, and placing the heavier dressing increased yields still further. Where considerable acreages of horticultural crops are grown on ordinary farmland the use of a placement drill may be very profitable. On old-established market-garden soils, which have been heavily dressed with organic manures, fertilizer dressings are not likely to increase yields very much.

Sugar-beet and mangels : Early experiments on sugar-beet and mangels (Cooke, 1949) showed that germination and plant establishment were seriously reduced when fertilizer and seed were placed in contact, and when the dressing was placed directly under the seed. Single bands of fertilizer placed (theoretically) one inch to the side of the seed were liable to be placed under the seed when the relative positions of seed and fertilizer coulters were distorted in work. In all later experiments, all drilled dressings were applied in a single sideband 2 in. to the side of the seed. There was no instance of reduced germination from this method of application.

Placed dressings of complete fertilizer gave better early growth of sugar-beet than broadcast fertilizer. These differences in growth persisted through the early part of the growing season, but at harvest both broadcast and placed dressings gave almost identical increases in yield (Cooke, 1951).

Experiments on mangels gave results similar to those obtained with sugar-beet (Cooke, 1949).

Kale and carrots : Experiments on kale compared broadcasting and placing of a PK fertilizer. Placement improved early growth but differences diminished during the growing season, and, at harvest, placed fertilizer gave only slightly higher yields than broadcasting (Cooke and Widdowson, 1953). In experiments on carrots carried out in 1950, broadcast fertilizer was, on average, superior to placed dressings.

Swedes and turnips : Swedes and turnips are mainly grown in the northern and western part of Britain. In experiments carried out by Cooke (1949) crops were generally poor, but placed dressings gave higher yields than equivalent broadcast dressings.

Other experiments on swedes have been carried out by Reith (1954) in Scotland ; generally broadcast and placed dressings of fertilizer gave similar yields. Reith points out that most roots are grown on ridges in Scotland and that broadcast dressings are concentrated in the ridges when they are set up, so that partial placement is achieved. Comparisons between broadcasting and placing the separate constituents of an NPK compound fertilizer showed that placing superphosphate directly beneath the seed was superior to broadcasting. Benefits from placing superphosphate were reduced when it was applied in a band 2 in. to the side of the seed. Both sulphate of ammonia and muriate of potash reduced germination when placed directly beneath the seed, but the danger was minimized when wet weather followed sowing. When these soluble fertilizers were placed in side-bands germination was not affected. There was no benefit from placing dressings of potash and nitrogen in these experiments as broadcast dressings gave similar yields. Broadcasting and placing of complete NPK fertilizers gave similar yields, the improvements from placed superphosphate being counterbalanced by the depressions caused by the placed mixture of nitrogen and potash.

Herbage crops : Fertilizer applied to established herbage crops is broadcast. Dressings of phosphate and potash applied in this way may remain on the surface of the soil and be of little value to the crops.

The possibility of applying fertilizer in bands below the sward was examined by Cooke and Widdowson (1953). Experiments on sainfoin, lucerne and on permanent grass compared drilled dressings of PK fertilizer placed in bands 3 in. below the soil surface with surface dressings of the same fertilizer. Broadcast dressings gave higher yields of hay from both types of crop than equivalent placed dressings. The advantages of an equal supply of nutrients to all the plants in an established sward outweigh any disadvantages of confining the dressings to the surface.

Lucerne : Two experiments compared broadcast dressings of PK fertilizer with equivalent dressings placed 2 in. to the side of the seed at sowing. Placed fertilizer did not improve early growth and both broadcast and placed dressings gave similar yields over the two years of the experiments (Cooke and Widdowson, 1953). Comparisons were made between applying the whole dressing of fertilizer in the seeding year and applying half at sowing and the remainder in the following year. There was no advantage from splitting the dressing.

In another experiment on lucerne, a "starter dose" of 2 cwt. of granular superphosphate per acre was drilled 2 in. below the seed (Cooke and Widdowson, 1953). This dressing was tested in the presence, and absence, of broadcast dressings of superphosphate and muriate of potash. The "starter dose" of superphosphate promoted rapid early growth and establishment and was much superior to heavier dressings broadcast over the seedbed. Two cuts of hay were taken in the seeding year. The "starter dose" of placed superphosphate gave higher yields than broadcast superphosphate at both cuttings. Benefits from the "starter dose"

persisted through the three years of the experiment. Rapid development of the plants caused by 'starter' phosphate enabled them to make full use of soil nutrients.

Fertilizer Placement in Other Countries

The United States of America : A great deal of experimental field work has been carried out in the USA during the last 30 years to determine the value of placed fertilizer for most important crops. The bulk of this work has been published by the National Joint Committee on Fertilizer Application (1925-53). A summary of the results of work carried out before 1948 has been published by the National Fertilizer Association (1948) and this has been used to provide much of the information in this section.

Maize : Recent American recommendations indicate that maize should receive 1000 lb., or more, of fertilizer per acre. Of this dressing 100-300 lb. should be applied in a band to the side of, and below, seed level to act as a "starter" for the crop (Cumings, 1953). The rest of the dressing may be ploughed-in in autumn or spring in low-rainfall areas or applied with a fertilizer drill 6-8 in. below the soil surface and to the side of the seed. Surface dressings are not recommended. Additional nitrogen should be applied as a side-dressing 5-8 weeks after sowing and should be drilled between the rows to avoid damage to the roots.

Cereals : All fertilizer applied at seeding should be applied by combine-drill. The "starter effects" of these dressings are important for winter wheat, they give vigorous crops which are more likely to over-winter satisfactorily. Most of the "starter effect" is due to superphosphate. Although under adverse conditions, heavy dressings of N and K are likely to reduce germination, this is of little practical importance since only small amounts are normally drilled with the seed. For autumn-sown grain at least part of the nitrogen dressing should be withheld until spring.

Horticultural crops : Fertilizer should be applied in a band 2-3 in. to the side of the seed and 1-2 in. below seed level. Where very heavy dressings are being used, part should be broadcast and ploughed in and the remainder applied in single sidebands at sowing. Benefits from sideband placement have been obtained with most horticultural crops. The value of placement is most marked for crops with poorly-developed root systems and short growing seasons.

Sugar-beet: Fertilizer applied at sowing should be applied in sidebands. Side-dressing with nitrogen after singling is recommended in some areas.

Potatoes : Fertilizer applied at planting should be placed in two sidebands each 2 in. to either side of the seed potato. Where large amounts of fertilizer are used, part of the dressing may be ploughed in or drilled into the soil about 5 in. deep after ploughing. Under some conditions there is an advantage in splitting heavy dressings in this way.

Pastures : For rapid pasture establishment, small dressings of phosphate and potash should be drilled 3 in. below the soil surface with a combine-drill. Modifications to the drill allow the seed to fall into the furrows left by the fertilizer coulters. The fertilizer acts as a "starter" and encourages rapid development. There was no advantage from drilling fertilizer dressings into established swards.

For lucerne, part of the seedbed dressing should be applied as a "starter" and part broadcast and ploughed in. Subsequent dressings may be broadcast or drilled into the sward by combine-drill. Seedbed dressings are of greater value than later top-dressings.

Placement in Europe

The Netherlands : Important theoretical work on fertilizer placement has been carried out by de Wit (1953). He concluded that the width of the fertilizer band determined the value of placed fertilizer, light dressings were best placed in narrow bands, but heavy dressings in narrow bands produced lower yields than broadcast fertilizer. If the value of one nutrient is reduced by another nutrient, then by placing one of the nutrients, higher yields will be obtained than when both nutrients are placed or broadcast. The distance between seed and fertilizer was found to be important only in avoiding injury to germination and on very poor soils. On better soils, early growth may depend on seed/fertilizer positions but similar final yields are obtained from bands placed in different positions, the ultimate value of different ways of applying fertilizer does not depend on early effects. When nutrients are "fixed" to useless forms, then placing in bands may have advantages. Placement is valuable when crops do not root through the whole volume of fertilized soil. Optimum depths for placing fertilizer depend on the season and the best depth can only be predicted by also forecasting the weather! de Wit considers that the optimum width of the fertilizer band is one-fourth of the distance between the rows of the crop and that 50-60% of phosphate dressings may be saved by using band placement. He does not expect placement of potash to have any advantage on coarsely-textured soils ; on clay soils where potash is "fixed" then placement in bands having a width equal to one-quarter of the inter-row spacings may have advantages. de Wit also concludes that, on average, placing of nitrogen fertilizers is 25% more efficient than broadcasting. These conclusions are in general agreement with the results of field experiments in Britain and other countries.

Prummel (1953) has shown that placing was superior to broadcasting in experiments testing

phosphate for beans, nitrogen for oats, and potash for potatoes grown on alluvial clay soil.

Finland: Stewart (1952) quotes the results of experiments which showed that best use was made of superphosphate by applying it with the seed for cereals and for potatoes. Benefits from placement were greatest on poor soils or where phosphate was readily "fixed."

Italy: Experiments comparing methods of applying fertilizer to sugar-beet are summarized by Stewart (1952). Fertilizers placed near the seed increased yields markedly, "broadcast application was very ineffective and seems hardly economic."

France: Depardon and Buron (1951) found that complete NPK fertilizer placed either 6 in. away to the side of the seed or 8 in. below the seed was inferior to broadcast fertilizer for potatoes. In England, it is considered that bands of fertilizer placed at these distances from seed potatoes are too far away and will not be used efficiently.

Sweden: Franck (1948) showed that drilling superphosphate with the seed of cereals produced higher yields than broadcasting. Combine-drilling of NP, PK and NPK mixed fertilizers produced higher yields of cereals than broadcasting.

Denmark: Larsen (1951) found that there was no advantage from drilling, as compared with broadcasting, of fertilizers for cereals and for root crops.

Summary

Experiments in many countries have shown that gains in yield are obtained by using some method of localizing fertilizer near to the seed or roots of crops. Benefits from placement are likely to be greatest on soils which are deficient in 'available' plant nutrients, the technique often allows crop production to be brought up to a high level in a short time. On soils which have been adequately manured for many years placement is not likely to provide such marked benefits. On richer soils, placement is a suitable way of applying the small dressings needed as an insurance against unsuspected soil deficiencies, attacks by pests and diseases, or unfavourable growing conditions.

Most of the published work reviewed here shows that it is essential to concentrate dressings of phosphate close to the roots of plants if full benefits are to be obtained from the dressings. Some workers have shown that placed dressings of nitrogen and potash are superior to broadcasting under certain conditions.

Conflicting findings on the value of placement in different countries may often be due to differences in fertilizer practice and methods of growing crops. It is difficult to compare experiments in different countries because cultural practices in the experiments are rarely described in sufficient detail.

Placement is only one aspect of the wider subject of manuring, but methods of applying fertilizers must always be considered at the same time as manures are being chosen for a particular crop. By using the most suitable method of placement, farmers will be able to obtain the best return from their outlay on fertilizers.

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FIELD CROPS

CEREALS

WHEAT

1170 SIMLOTE, K. M. **A résumé of studies on wheats in Malwa.** *Indian J. agric. Sci.* 1954, **24,** Pt. 4, 271-300, bibl. 9, illus. [Inst. Pl. Industr., Indore]

An account is given of studies on wheat carried out in the Malwa wheat-growing tract in 1932-51. Most of the experiments and breeding work mentioned took place before 1946. Studies were made of : (a) morphological development of local and exotic varieties of wheat ; (b) seed-vernalization ; (c) effect of sowing dates on yields ; (d) the effect of manuring (including green manuring) on yields ; (e) cultivation practices ; (f) pests and diseases.—W.J.B.

1171 FAJERSSON, F. Weibulls Original Banco-vete. [**Weibull's Original Banco wheat.**] *Agri. hort. genet.* 1954, **12,** No. 3-4, 150-72, bibl. 10, English and German summaries pp. 169-71.

A report is given of the more important results of varietal trials since 1954 with Banco in Sweden. Banco is intended for cultivation in the southern and eastern parts of south Sweden. In trials during 1945-53 at Weibullsholm, Banco outyielded Eroica by 4·2%, Eroica II by 2·1%, Svalöf's Hansa by 14·5% and Svalöf's Skandia III B by 15·7%. In all official trials with Banco in south Sweden during 1946-53, Banco outyielded Eroica, Eroica II, Hansa and Skandia by 6·8, 8, 7·3 and 7%, respectively ; the yield differences between Banco and the other varieties were highly significant in all cases. The yield superiority of Banco was particularly marked in 1951, a year with a high incidence of stem rust. In experiments in Denmark, Banco, Skandia III B and Eroica all showed a similar degree of winterhardiness. In Swedish trials, Banco appeared to be slightly less winter-hardy than Eroica and to be less resistant to snow mould (*Typhula* spp.]. In normal Swedish winters, Banco has overwintered in a fully satisfactory manner. The resistance to lodging of Banco was slightly better than that of Eroica, as good as that of Skandia and Skandia III B, and considerably better than that of Hansa. In trials at Weibullsholm and in official trials, Banco matured nearly 3 days earlier than Eroica, 1·5-2 days earlier than Hansa and up to 3 days earlier than Skandia III B. In trials on seed shattering, Banco appeared to be well suited to combine harvesting. The hectolitre weight of Banco is similar to that of Eroica, slightly higher than that of Hansa and considerably higher than that of Skandia III B. The 1000-grain weight of Banco is lower than that of Eroica, Hansa and Skandia III B. Of late years, Banco has shown better resistance to *Erysiphe graminis* than Eroica.—P.J.B.

1172 GADEA, M. Quinto año de experiencias con nuevas variedades de trigos. [**Fifth year of experiments with new varieties of wheat.**] *An. Inst. nac. Invest. agron.* 1954, **3,** No. 3, 5-81.

Numerous new varieties of wheat were tested against standard wheat varieties in various agricultural regions of Spain in 1949-53. The results for 1952-3, showing the yields of grain and the resistance to disease of each, are presented.—W.J.B.

1173 TELLEZ, R. and GARCIA, E. Ensayos comparativos de rendimiento de trigos híbridos (1952-53). [**Comparative yield-trials with hybrid wheat varieties 1952-3.**] *An. Inst. nac. Invest. agron.* 1954, **3,** No. 3, 83-135.

The results of yield trials in 1952-3 with numerous hybrid varieties of wheat, in various agricultural regions of Spain, are reported.—W.J.B.

1174 JOURNAL OF THE DEPARTMENT OF AGRICULTURE OF SOUTH AUSTRALIA. **Wheat varieties suitable for South Australia.** *J. Dep. Agric. S. Aust.* 1955, **58,** No. 9, 384.

1175 REITZ, L. P. **Responses of hard winter wheat varieties in regional tests.** *Diss. Abstr.* 1955, **15,** No. 6, 947. [Univ. Minnesota]

The studies reported were made to determine the extent to which winter-wheat varieties were subject to hazards of production in the uniform regional tests currently used in the Plains region of the USA and to determine the nature and cause of some of the responses found. Data from trials with about 30 varieties grown at 13 locations during 1932-53, with certain other data, were used. From the results, it was concluded that regional trials are of value for determining the area of adaptation of varieties and for determining such characters as grain yield. Within natural ecological zones, regional averages offset the need for long test series at given stations. All stations do not benefit equally from, or contribute equally to, regional tests. The need is stressed for critical studies of regional data to supplement local data to confer the maximum predictive value on regional data.—P.J.B.

1176 IRLENBUSCH, J. Untersuchungen zur Klärung der Frage des Herkunftswertes von Winterweizen. [**An investigation to clarify**

the problem of the "source value" of winter-wheat.] *Z. Acker- u. Pflbau* 1955, **99,** No. 3, 361-92, bibl. 75, illus. [Karl-Marx-Univ. Leipzig, E. Germany]

The differences in characteristics between seed of the same variety of winter-wheat grown under different environments are said to be at least as great as the differences between varieties. This is illustrated by 5 varieties of winter-wheat (Bastard II, Criewener 192, Derenburger Silber, Hadmerlebener IV and Kleinwanzlebener) grown in 14 locations through Eastern Germany. The seed properties studied included 1000-grain weight, viability, rapidity of germination, germination energy, transpiration, osmotic activity and chemical content. The importance of the effect of source of seed on yield is discussed. New definitions based on the results of these experiments, are suggested for "varietal value" "seed value" and "source value of a bred variety."—D.B.

1177 BECKER, H. A. and SALLANS, H. R. **A study of internal moisture movement in the drying of the wheat kernel.** *Cereal Chem.* 1955, **32,** No. 3, 212-26, bibl. 9. [Prairie Reg. Lab., Nat. Res. Coun., Saskatoon, Saskatchewan]

1178 BLÜMKE, — Das Unkraut im Weizen. [**Weeds in wheat.**] *Dtsch. landw. Pr.* 1954, **77,** No. 12, 169-70. [Northeim, S. Hannover, W. Germany]

In southern Hanover, spraying with growth hormones has destroyed many of the weeds of cereal fields but their place has been taken by hormone-resistant weeds which, in the absence of competition, are now a greater menace than formerly. These are moneywort, corn chamomile, wild chamomile, mouse-ear chickweed, gromwell and particularly goosegrass. In stands of winter wheat they have been successfully controlled by spraying with Hederich-Kainit at 5 dz./ha., together with calcium cyanamide at 1 dz./ha. The herbicide is best applied between 5 and 7 a.m. when there is a heavy dew. [1 dz. = 100 kg.]—D.B.

1179 BACHTALER, G. Der Einfluss einer Überdosis 2,4-D- und 2,4,5-T-Unkraut-Bekämpfungsmittel auf verschiedene Winterweizensorten. [**The effect of an overdose of 2,4-D and 2,4,5-T herbicides on several winter-wheat varieties.**] *Z. Pflbau* 1955, **6,** No. 1, 40-8, bibl. 8, illus. [Bayerische Landesanstalt für Pflanzenbau und Pflanzenschutz, Munich]

A second application of chlorophenoxyacetic acid to weed-infested wheat plots, whether applied as 2,4-D or 2,4, 5-T, salt or ester, produced abnormal ears. The deformity, different in different varieties, was expressed as elongation, shrinkage or bending. There was a reduction in yield in those varieties which produced shrunken ears. The deformity did not reduce germination capacity nor was it inherited.—D.B.

1180 HAGSAND, A. E. Hormonderivatens inverkan på stråsäd och lin efter besprutning vid olika tidpunkter. 1. Höstsäd. [**The effect of hormone derivatives on cereals and flax after spraying at different times. 1. Winter wheat.**] *K. LantbrAkad. Tidskr.* 1954, **93,** No. 2-3, 179-98, illus.

Odin winter wheat was sprayed at different growth stages with Weedone (9-10% acid equivalent of 2,4-D ethyl ester) and Agroxone (9-10% a.e. of MCPA Na salt) at rates of 10 l. per ha. in 1000 l. spray volume. The time of spraying ranged from 19 Sept.-28 May in 1949-50 and from 25 Sept.-30 May in 1950-51, as far as possible at 3-day intervals. Weedone caused considerable growth abnormality, while Agroxone caused only slight abnormalities. Leaf abnormalities were caused by spraying with Weedone in autumn, with up to 50% of plants showing such abnormalities following spraying on 23 Oct. Surveys in the summer of 1951 showed that treatments made later than 13 Oct. caused the most abnormalities. Similar treatments with Agroxone caused only slight abnormalities. Spring treatments with Weedone resulted in a large proportion of ear abnormalities, particularly opposite spikelets. Relatively later sprayings resulted in the production of a certain number of supernumerary spikelets, though this did not occur where Agroxone was used. Plants sprayed with Weedone appeared to have a slightly better resistance to lodging than those not treated, or treated with Agroxone. 1000-grain weights were reduced where severe abnormalities were caused by the treatments and appeared to be lower the later in autumn the treatments were applied. This occurred where either Weedone or Agroxone was applied. The germinating capacity of the grain was reduced only where abnormalities were severe. Grain yield reductions were marked where severe leaf abnormalities were caused by autumn treatments ; spike abnormalities reduced grain yields only where they were very severe. In terms of leaf numbers, spraying with Weedone at the 1-3 leaf stage caused no abnormalities, spraying at the 3-10 leaf stage (up to the end of October) caused severe leaf abnormalities, spraying at the 8-15 leaf stage in spring caused opposite spikelets, at the 12-20 leaf stage it caused supernumerary spikelets and at the 20-leaf stage, onward, no abnormalities resulted. It was concluded that farm spraying should be done in early spring with Agroxone though in south Sweden, autumn treatments with Agroxone were also permissible.—P.J.B.

1181 ASANA, R. D. and others. **The effect of auxins on the growth and yield of wheat.** *Physiol. Plant.* 1955, **8,** No. 2, 279-87, bibl.

7. [Bot. Div., Indian Agric. Res. Inst., New Delhi]

Auxins were applied to wheat plants, grown in pots, through cut leaf tips, or in foliage sprays. In experiments during the first three seasons of these trials, beta-indolylacetic acid (IAA) was used. In one season, only, were grain yields significantly increased by IAA treatment, the effect being due to increased ear numbers. In trials during 1952-3, alpha naphthaleneacetic acid (NAA), beta-indolylbutyric acid (IBA) and tri-iodobenzoic acid (TIBA) and IAA were used on the varieties N.P. 710 and Punjab C228. Some treatments significantly raised grain yield, tiller production, ear and leaf numbers and spikelet numbers on the main shoot. With N.P. 710, in 5 cases out of 11, grain yield increases were due to increased ear numbers ; 1000-grain weights and number of grains per ear were also increased, but not significantly, in the remaining 6 cases out of 11. In trials in 1953-4 with the same varieties, the interaction of N supply and auxin treatment was studied. NAA and IAA were used at concentrations of 15 and 100 ppm. IAA, only, at either concentration, significantly increased the grain yield of N.P. 710, largely owing to an increase in grain numbers per ear. Interaction between N treatment and auxin was not significant in the case of grain yields ; both increased grain yields more or less equally. In field trials in 1953-4, interactions between N supply and auxin treatment were again studied. The effect of auxin in increasing yields was much less than that of N. In view of the effect of a number of factors in interfering with auxin action, it was thought that further studies were needed on this subject, as a preliminary to work on its practical use in the field. In these trials, the auxins were applied just before the initiation of double ridges on the main axis and their influence was exerted on late events, such as the setting and filling of grains.—P.J.B.

1182 FUSHTEY, S. G. **The control of dwarf bunt of winter wheat with chemical seed treatments.** *Pl. Dis. Reptr* 1955, **39,** No. 5, 378-9. [Bot. Dep., Ontario Agric. Coll., Guelph]

Fungicides, including Ceresan M, Tritisan, Anticarie SD and Panogen 15 were applied at recommended rates and at double these rates to wheat seed infected with *Tilletia brevifaciens* spores. The seed was then germinated in soil media incubated at 5°C. for 10 weeks. Ceresan M did not prevent spore germination, while the other materials completely prevented spore germination for the 10-week period. These results showed that dwarf bunt inoculum on seed could be controlled, even though protection against soil-borne inoculum could not be secured.—P.J.B.

1183 ENGLAND AND WALES Ministry of Agriculture and Fisheries. **Wheat bulb fly** [*Leptohylemyia coarctata*]. *Adv. Leafl. 177. England and Wales Minist. Agric. Fish.* 1955, pp. 4.

1184 HENDERSON, C. F. and TILTON, E. W. **Tests with acaricides against the brown wheat mite.** *J. econ. Ent.* 1955, **48,** No. 2, 157-61, bibl. 3. [Kansas Agric. Exp. Sta., Manhattan]

Trials were conducted during the spring and autumn of 1952 and the spring of 1953 to study the effectiveness of various acaricide sprays against the brown wheat mite (*Petrobia latens*) on wheat. Parathion, applied at the rate of 0·5 lb. per acre, was best.—E.B.O.

1185 MCNEAL, F. H. and AFANASIEV, M. M. **Transmission of barley stripe mosaic through the seed in 11 varieties of spring wheat.** *Pl. Dis. Reptr* 1955, **39,** No. 6, 460-2, bibl. 5. [Montana Agric. Exp. Sta., Bozeman]

In trials in Montana, plants of 11 spring-wheat varieties were inoculated with barley stripe mosaic virus. Barley stripe infection in plants grown from seed harvested from the inoculated plants showed that the virus was seed-borne in spring wheat. Varietal differences in the incidence of the disease were noted. As a logical deduction from these findings it was thought that certified seed stocks of spring wheat should be tested for the presence of the virus.—P.J.B.

1186 BARNARD, C. **Histogenesis of the inflorescence and flower of *Triticum aestivum* L.** *Aust. J. Bot.* 1955, **3,** No. 1, 1-20, bibl. 19, illus. [Div. Pl. Industr., CSIRO, Canberra, A.C.T.]

This study of *T. aestivum* included the morphogenesis of the spike, spikelet and flower, the histology of the spike, leaf primordia and spikelet primordia, and tissue differentiation in the spikelet and floral parts. The first evidence of change from the vegetative to the reproductive condition in the spike was elongation of the apical cone. In winter varieties this change took place with the formation of the 13th or 14th leaf ; in spring varieties with the formation of the 10th or 11th leaf. Under field conditions this stage is reached in the winter varieties 10 weeks, and in the spring varieties 4-6 weeks, after sowing. The findings indicate that (1) the flower in *Triticum* is a reduced branch system subtended by the lemma ; (2) the palea, lodicules and carpels are foliar appendages ; (3) contrary to classical theory, the stamens are lateral branches of the floral axis and the ovule is terminal on this axis.—D.B.

1187 ASANA, R. D. and MANI, V. S. **Studies in physiological analysis of yield. 2. Further observations on varietal differences in photosynthesis in the leaf, stem and ear of wheat.**

Physiol. Plant. 1955, **8,** No. 1, 8-19, bibl. 12. [Bot. Div. Indian Agric. Res. Inst., New Delhi]

A critical consideration is given of the results of observations made on varietal differences in the photosynthetic responses of the leaf, ear and stem of wheat during the post ear-emergence period, as affected by season, and of the causes of varietal differences in photosynthesis in different plant organs, and the relation between photosynthetic response during the post ear-emergence period and grain yields. The contribution to net assimilation from photosynthesis in the ear and leaf was, in general, larger than that from the stem and the contribution from the ear was much less affected by the season than that from the leaf and stem. It appeared that there existed varietal differences in the photosynthesizing rates of the ear ; also, that the varietal differences in ear contribution, with a few exceptions, appeared to be related to the presence of awns and differences between spikelet numbers. Varietal differences in the contribution of leaf and stem could be accounted for, to some extent, by differences in functional area, as judged by the persistence of green colour. There did not appear to be a direct relationship between net assimilation and grain yield. The question of transfer of reserve material from the stem to the ear is regarded as still in doubt, owing to the lack of experimental evidence. It is suggested that the ear is filled almost entirely by material photosynthesized after anthesis and that varietal differences in grain yields can be largely accounted for by such attributes as leaf and stem size, spikelet number, the presence of ear awns and the functional period of these attributes.—P.J.B.

1188 HEDIN, L. and others. Recherches sur la caractérisation chimique d'espèces et de variétés de plantes fourragères et prairiales. [**Research on the chemical characterization of species and varieties of forage and herbage plants.**] *Ann. Inst. nat. Rech. agron., Paris. Sér. B. Ann. Amélior. Pl.* 1954, **4,** No. 4, 469-503, bibl. 7, illus. [Lab. Plantes Fourragères, Rouen] [Received June, 1955]

The changes during a growing period in the mineral composition (SiO_2, CaO, MgO, K_2O and N) of the last-formed leaf of varieties of wheat and maize and ecotypes of *Dactylis glomerata, Arrhenatherum elatius* and *Festuca elatior* were studied. The results have been analysed statistically and notes are given on the analytical methods used. In the case of wheat and maize, the tables and graphs demonstrate the variation in mineral content of the leaf, not only in different varieties but also during the course of development of the same variety. [See also *Herb. Abstr.* 23 : 504.]—D.B.

1189 ŽOLKEVIČ, V. N. [**The influence of irrigation on metabolism in spring wheat in relation to the crop's productivity.**] [Russian] *Fiziol. Rast. (Pl. Physiol.)* 1955, **2,** No. 2, 123-31, bibl. 24, illus. [Timirjazev Inst. Pl. Physiol., Acad. Sci. USSR]

Experiments carried out under field conditions at the Engel's Experimental Station, Saratov Province, with the spring-wheat varieties Černokoloska and Melanopus 69 are reported. There is information regarding : (1) change in the synthetic and hydrolytic capacity of the leaves under irrigation in drought conditions ; (2) accumulation, under drought, of soluble carbohydrates as a result of impeding the flow of nutrients ; and (3) dependence of the effectiveness of respiration on water supply. It is concluded that the high productivity of spring wheat under irrigation depends on the following, among other, factors : (a) the increased rate of saccharose synthesis in the leaves at the period of shooting/earing ; (b) strengthening of the hydrolytic processes in leaves at the initiation and filling of grain ; (c) the active flow of assimilates from leaves to ears ; and (d) the more effective utilization of respiration energy and the consequent obviating of unproductive expenditure of plastic substances.—M.H.

1190 DULAC, J. Diagnostic foliaire des céréales. 1. Relation entre le rendement et la teneur en azote de chaque feuille chez le blé. 2. Éléments généraux d'interprétation de la relation " azote-rendement " chez le blé. [**Foliar diagnosis of cereals. 1. Relationship between the yield and the nitrogen content of each leaf of wheat. 2. General elements of interpretation of the relationship " nitrogen-yield " in wheat.**] *C.R Acad. Fr.* 1955, **41,** No. 7, 328-33, bibl. 4, illus.

The wheat variety Étoile de Choisy was used. Under ideal conditions, grain yields of 2400-10,600 kg. per ha. were found to be directly related to the N-content of the leaves which ranged from 1·7% to 4% of the dry matter. Results confirmed that the determination of the N-content of leaves 2 and 3 below the ear of corn as an indication of yield was justified for normal yields of 25,000-10,000 kg. For lower yields, leaf 1 suffices and for greater yields leaves 4 and 5 are suitable. This relationship is discussed.—M.P.

1191 CARLES, J. and others. De l'influence de la fourniture retardée d'engrais azotés sur le rendement du blé. [**The effect of delayed application of nitrogenous fertilizers on the yield of wheat.**] *C.R. Acad. Agric. Fr.* 1955, **41,** No. 6, 306-11, bibl. 3.

Nitrate of lime was applied to pot cultures of the spring-wheat variety Fylgia at sowing, and 29, 36 and 71 days after sowing (i.e. at tillering, shooting and flowering). Yields and composition of the plants

were studied, the problem being viewed purely physiologically. From the results it was concluded that, for maximum yields and best use of the N, the fertilizer should be applied in two lots : at tillering to increase the number of shoots and for good ear development ; and just prior to heading in order to increase the N-content of the grain. The date of application was also considered to be important in that the sensitivity of the plant's reaction to, and the efficiency of utilization of, the additional N, will be dependent on the developmental stage of the plant. [See also *Fld Crop Abstr.* 7 : 773 and 774, 775.]—M.P.

1192 NIGGEMANN, J. Die Wirkung der N-Düngung bei verschiedenen Winterweizen-(und Sommergersten-) Sorten. [**The effect of N-manuring in several varieties of winter-wheat (and spring-barley).**] *Z. Pflbau* 1955, **6,** No. 2, 74-80, bibl. 19. [Techn. Hochsch. München-Weihenstephan, Bavaria]

The investigation is concerned with the effect of increasing applications of N on the quality of the grain.—D.B.

1193 ISOM, W. H. **The differential response of wheat varieties to different levels of nitrogen.** *Diss. Abstr.* 1955, **15,** No. 6, 929. [Cornell Univ., Ithaca, N.Y.]

Ten varieties of winter wheat were grown in New York State during 1952-4. N treatments applied were nil, 20, 30, 40 and 50 lb. of available N per ac. The varietal responses measured were : intervarietal competition, grain yield, test weight of grain and straw length. Competitive ability did not appear to be related to high yield and was not affected by N treatment. The range of greatest difference in varietal response to N was between the 30 and 50 lb. per ac. treatments. Given varieties were very inconsistent in their response to N. N treatments appeared to be able to affect the yields and test weights of varieties differentially, but not to be able to affect plant competition or straw length.—P.J.B.

1194 PETINOV, N. S. and PAVLOV, A. N. [**Increase of protein content in spring-wheat grain (grown under irrigation) by means of spraying with nitrogenous supplements.**] [Russian] *Fiziol. Rast.* (*Pl. Physiol.*) 1955, **2,** No. 2, 113-22, bibl. 32, illus. [Timirjazev Inst. Pl. Physiol., Acad. Sci. USSR]

Many works are cited which support the view that irrigation increases the yields of wheat grain but lowers the grain's protein content. The authors' experiments, carried out at the Engel's Experimental Station, Saratov Province, during 1953 (6 replications) and 1954 (3 replications) with the hard spring-wheat varieties Černokoloska and the soft spring-wheat Lutescens 758 have shown that protein content of the grain can be increased in both varieties by spraying with ammonium nitrate, regulated in quantity according to the number of sprayings and stage of plant growth. For example, the content of protein N (as % dry wt.) after spraying (knapsack method ; rate not given) at the shooting phase was 3·47, 4·02 and 3·54 under irrigation, irrigation plus spraying and without irrigation, respectively. There is evidence that spraying hard wheat with the nitrogenous supplements increases the protein content of the grain (in 1953 tests) by 2·2%, which, from a harvest of 1820 kg./ha., represents an increase in protein yield of 64 kg./ha. For soft wheat (in 1954 tests) protein content was increased by 1·7%, which represents a protein increase of 62 kg./ha. from a harvest of 2800 kg./ha.—M.H.

1195 JOHNSON, W. J. and SCHRENK, W. G. **The effect of fertilizer treatment on the composition of wheat at different stages of growth in south-eastern Kansas.** *Trans. Kans. Acad. Sci.* 1953, **56,** 456-64, bibl. 10. [Kansas Agric. Exp. Sta., Manhattan]

The trials reported were carried out during 1947 and 1948. Manurial treatments to wheat in 1947 included 80 lb. per ac. 20% superphosphate and 10·6 lb. per acre 50% KCl, and, in 1948, 150 lb. superphosphate and 60 lb. KCl per ac. The wheat was grown either after a legume crop, or after a non-legume crop, with or without lime or 8 tons farmyard manure per ac. The wheat plants were cut each year when 3 in. high, or at 10 or 20 days later. These stages were intended to represent those at which cattle commonly graze wheat in Kansas. Analyses of the plant tissues were made for carotene, total ash, N, P, K, Ca and Mg. Manurial treatments, particularly P, markedly decreased both N and carotene contents. Where no previous legume crop was grown, P treatments in both years reduced the average carotene content from 49 to 36·6 mg. per 100 g. dry matter. P treatments markedly increased the P content of the wheat plants ; on the non-legume plots, P treatments increased the average P content by 57%. The lime, farmyard manure and K treatments had no significant effect on P content. The P treatments resulted in considerable reductions in K contents ; the average K content of untreated controls was 2·8%, compared with an average of 2·17% where P was used. Manurial treatment had no apparent effect on Mg contents. Carotene contents increased between the first and second cutting stages, but the gain was more than lost during the period between the second and third cuts. N, total ash and P contents all decreased as the plants matured. —P.J.B.

1196 KHAN, A. R. and others. **Response of berseem to fertilizers and comparison of after-effects**

with those in cereals. *Indian J. agric. Sci.* 1954, **24,** Pt. 4, 317-22, bibl. 13. [Indian Agric. Res. Inst., New Delhi]

The effect on the yields of berseem (*Trifolium alexandrinum*) and succeeding crops of applications of fertilizers to berseem in a 2-year rotation of fallow/berseem/fodder-maize/wheat, was determined in 1948-52 in an experiment in which the following manurial treatments were applied ; (1) N, P and K in various quantities and combinations, applied to berseem ; (2) ammonium sulphate (40 lb. N per ac.) applied to maize and wheat ; (3) control, no manure. The rotation-cycle was completed twice during the 4-year period. Treatments (1) gave highly significant increases in the yield of berseem fodder (26-44%) in the first 2-year period and approx. 120-140% in the second 2-year period. The yields of fodder-maize (compared with control) were significantly increased by (1) and (2) ; (2) gave higher yields than (1). Yields of wheat grain, compared with control, were increased by both (1) and (2) ; in general, balanced NPK treatment applied to the berseem gave higher yields than applications of one or two of these fertilizers only. There was no significant difference between the effect on wheat yields of treatment (2) and the most effective of treatments (1) (ammonium sulphate at 40 lb. N, superphosphates at 120 lb. P_2O_5, potassium sulphate at 80 lb. K_2O per ac.) ; these 2 treatments both gave increases of approx. 60% in wheat-grain yield, compared with control, at the end of the second rotation-cycle.—W.J.B.

1197 Zuev, L. A. and others. [**The absorption by plants of phosphorus from fertilizers placed in the soil.**] [Russian] *Počvovedenie* (*Pedology*) 1955, No. 2, 32-41, bibl. 9, illus. [Moscow State Univ.]

Absorption by spring wheat, buckwheat and flax of phosphorus from superphosphate, marked with radioactive P and placed in sod-podzolic soils of various degrees of cultivation, was studied in pot and field experiments.—From *Soils and Ferts* 18 : 1742.

1198 Schenk, R. U. and Kennedy, W. K. **Laboratory evaluation of fungicides for the preservation of moist grain.** *Agron. J.* 1955, **47,** No. 3, 128-30, bibl. 5. [Agron. Dep., Cornell Univ., Ithaca, N.Y.]

The experiments reported were conducted with a view to investigating the possibilities of treating moist grain with fungicides so as to preserve it for stock feed. Wheat grain with a moisture content of 29% was treated with 0·125, 0·25 or 0·5% 2,4,6-trichlorophenol, 0·1 or 1% thiourea, 0·05 or 0·1% 1-chloro-2-butanone, or 0·8% ethanol. The samples were held at 28°C. and determinations made of CO_2 evolution during storage. Samples treated with 0·25 and 0·5% 2,4,6-trichlorophenol showed no mould growth, low levels of CO_2 evolution, dry-matter losses of 5% after 79 days of storage, and the grain was still in sound condition. None of the other fungicides tested was able to protect the grain from moulding for this period of storage. Grain treated with 2,4,6-trichlorophenol had a slightly rancid taste and was darkened by the chemical at the end of storage. In these tests, 0·1% 1-chloro-2-butanone protected the grain for 23 days.—P.J.B.

1199 Fajersson, F Lagringens inverkan pa bakningsformagan hos vete av olika sort och proteinhalt. [**The effect of storage on the baking quality of wheat of different varieties and protein content.**] *Agric. hort. genet.* 1954, **12,** No. 3-4, 173-90, bibl. 18, English and German summaries pp. 186-9.

OATS

1200 Kaukis, K. and Reitz, L. P. **Tillering and yield of oat plants grown at different spacings.** *Agron. J* 1955, **47,** No. 3, 147. [Nebraska Agric. Exp. Sta., Lincoln]

Tillering in Otoe, Clinton, Cherokee, Nemaha and Marion oats grown at spacings of 2·5 and 5 in. in rows 7 in. apart, was studied. The early varieties Otoe, Nemaha and Cherokee produced grain on 88% of tillers, while the late varieties Clinton and Marion produced grain on 63 and 56%, respectively, where spacings of 2·5 in. in the row were used. The average total number of tillers formed was as great in late as in early varieties. Varietal differences in tiller numbers were less at the 5 in. than at the 2·5 in. spacing. Spacing plants 5 in. apart in the row resulted in 75% higher grain yields than where the 2·5 in. spacing was used. 77% of the yield increase in widely-spaced plants was due to tillering, 16% due to increased yields per tiller and 7% due to interaction between these two factors.—P.J.B.

1201 Eliasson, S. and Jacobson, G. Sortförsök med havre. Sammanställning av resultaten av de av Statens Jordbruksförsök ledda sortförsöken med havre under aren 1940 (1929)—1950 (1952). **Variety trials with oats. A collocation of the variety trials with oats conducted by the National Agronomy Experiment Station of Sweden during the years 1940 (1929)—1950 (1952).** *Medd. 48. Stat. Jordbrförsök* 1954, pp. 108, bibl. 185, English summary pp. 96-101.

The results are presented of local and official trials in Sweden with white- and black-oat varieties, both as individual summaries of data obtained from the main agricultural regions of Sweden and as a summary of the whole experimental data from all

regions. Varieties used were mostly bred by the Swedish Seed Association and the Weibullsholm Plant Breeding Institute ; a number of introduced varieties, mainly Finnish and Danish, were also included. A diagram is given illustrating the origins and mutual relationships of the varieties, with brief descriptions of each variety. The following varieties gave the highest yields in the main agricultural regions. In the Scanian Plains region : Pajbjerg Rex, Svalöf's Blenda and Svalof's Örn. In the South Swedish Foothill region : Blenda, Tammisto's Sisu, Rex and Sv. 01452. In the South Swedish Uplands : Rex, Blenda, Svalöf's Stormogul II and W. 14774. In the islands of Öland and Götland : Blenda, Örn, Sv. 01452 and Svalöf's Sol II, though Blenda and Sv. 01452 were tested for a short time only. In the West Swedish Plains, except South Halland : Stormogul II, Rex, W. 14774 and Svalöf's Engelbrekt II. In the Mälar and Hjalmar Lake districts : among black-oat varieties, Stormogul II, Engelbrekt II and Argus, and among white-oat varieties, Sisu, Örn and Rex. In the North Bergslagen district ; among black oats, Stormogul II and Engelbrekt II, and among white oats, Blenda, Rex and Sol II. In the coastal areas of Lower Norrland : Svalöf's Guldregn II (where early maturity was not important), Weibull's Bambu I, Svalöf's Sirius II and Svalöf's Vidar. In the coastal region of North Norrland : Svalöf's Same and Svalöf's Orion III. In Middle Norrland : Guldregn II and Vidar. In the High Mountain and Moraine regions : Same and Orion III. Data are also given of the date of maturation, straw strength, grain content, hectolitre weights and 1000-grain weights of the varieties.—P.J.B.

1202 JONES, J. M. and others. **Varietal resistance in oats to attacks by the stem and bulb eelworm.** *Pl. Path.* 1955, **4,** No. 2, 35-43, bibl. 6. [N.A.A.S., Trawscoed, Aberystwyth, Wales]

In trials during 1951-2 at two locations in Wales, the following varieties were tested for resistance to *Ditylenchus dipsaci* : Grey Winter, S.81, Picton, S.147, S.172, S.225 (spring oat), Unique and Early Grey Winter. The winter varieties were sown at a rate of 180 lb. per ac. in mid-October. Data are given of plant densities at different times of the year, the percentage of plants with " tulip root " symptoms, eelworm counts and mean grain yields. The results showed that S.147 was highly susceptible to eelworm. Picton occupied an intermediate position, while the remainder of the varieties, including S.225, were resistant and yielded well, even on infested soils. Resistance was not complete in resistant varieties early in the season, as evidenced by thinning-out of stands, but the extent of this was much less than in S.147 ; at later stages, the ability of resistant varieties to withstand eelworm attacks increased. The absence of complete resistance in resistant varieties early in the season was thought to entail some risk in sowing them on soil heavily infested with eelworms. —P.J.B.

1203 FERRARI, T. J. and SLUIJSMANS, C. M. T. **Mottling and magnesium deficiency in oats and their dependence on various factors.** *Plant and Soil* 1955, **6,** No. 3, 262-99, bibl. 19. [Agric. Exp. Sta. and Soil Res. Inst., T.N.O., Groningen, Netherlands]

1204 COFFMAN, F. A. ***Avena sativa* L., probably of Asiatic origin.** *Agron. J.* 1955, **47,** No. 6, 281, bibl. 8. [Fld Crops Res. Br., U.S. Dep. Agric.]

It is postulated that *A. sativa* was derived from polymorphous *A. byzantina* oats introduced into Europe by Slavonic invaders from Asia Minor, and that its origin was not through mutation in *A. fatua*. The evidence for natural selection towards *A. sativa*-like types of *A. byzantina* under northern conditions is pointed out.—P.J.B.

1205 ÅKERMAN, Å. Halten råprotein och fett hos några viktigare vithavresorter. [**The content of crude protein and fat in some more important (Swedish) oat varieties.**] *Svensk Jordbrforsk. Årsb.* 1955, **11**, 80-4.

The nutritive value of oat grain is discussed. Data are given of the crude protein and fat yields of the grain of two unimproved Swedish land-race varieties, Probsteier and a northern white oat from the Alvsborg Province, and 5 improved varieties, including Seger, Guldregn I and II, Örn and Sol II. The grain yields of the Alvsborg and Probsteier varieties averaged 16·3 and 5·1% lower, and the crude-protein content of the grain 0·74 and 0·3% higher, than that of Seger. Despite the higher crude-protein content of the Alvsborg and Probsteier varieties, their total average crude-protein yields in the grain were below that of Seger, which gave an average crude-protein yield of 442 kg. per ha. The rest of the varieties tested outyielded Seger in this respect, Guldregn II by 50·9 kg., Örn by 43·9 kg. and Sol II by 43·5 kg. per ha. The importance of breeding oats for still higher protein yields is stressed. The Alvsborg variety had a markedly lower fat content in the grain than the other varieties, while Örn averaged 59% higher fat content than the remainder.—P.J.B.

1206† MULVEHILL, J. F. and MACGREGOR, J. M. **The effect of some trace elements on the yield and composition of alfalfa and oats in Minnesota.** *Proc. Soil Sci. Soc. Amer.* 1955, **19,** No. 2, 204-7, bibl. 14. [Minnesota Agric. Exp. Sta., St. Paul]

Applications of soluble B, Mn, Zn and Cu to the soil of 13 experimental plots on a number of

important soil types in Minnesota had no significant effect on the yield of lucerne or oats. There was little positive correlation between the soluble B content of the soil and the total B content in oat grain. Applying 3 rates of B significantly increased the B content of oat grain, but had little effect on that of lucerne or lucerne/grass mixture. —From authors' summary.

1207 COFFMAN, F. A. **Results from uniform winter-hardiness nurseries of oats for the five years 1947 to 1951, inclusive.** *Agron. J.* 1955, **47,** No. 2, 54-7, bibl. 15. [Fld Crops Res. Br., Agric. Res. Serv., U.S. Dep. Agric.]

A table gives the average winter survival of 70 varieties and selections tested for one or more years. Winter Turf was used as a standard for comparison and had a weighted average survival of 69·5% in 560 nurseries. Wintok and Fulwin appeared to be the most winter-hardy varieties, with survival percentages 14·8 and 11·4% above that of Winter Turf, respectively.—P.J.B.

1208 OSTAZESKI, S. A. and BEVER, W. M. **The microflora of stored and field-collected oats.** *Pl. Dis. Reptr* 1955, **39,** No. 7, 591-6, bibl. 5, illus. [Agron. Dep., Univ. Illinois]

RYE

1209 HANSEN, F. Forsøg med havre og kartofler som forfrugt for rug. [**Trials with oats and potatoes as a preceding crop for rye.**] *Beret. 494. Stat. Forsøgsvirk. Plantekult.* [Contained in] *Tidsskr. Planteavl* 1955, **58,** No. 3, 463-84, English summary pp. 481-4.

The studies reported were designed to investigate the comparative merits of growing rye after spring oats or potatoes. On sandy soils in Denmark, where rye and potatoes are important crops, rye is often sown after potatoes, rather than spring cereals, since experience indicates better yields after potatoes. The studies reported were carried out at 5 locations on sandy soils during 1948-53. The oats were manured by amounts of N, P and K usual in practice and the potatoes were manured either with 30 tons dung per ha., plus a supplement of NPK similar to that given to the oats, or with amounts of NPK estimated to correspond to those in 30 tons of dung per ha. Two varieties of potatoes were used, a medium-early variety which permitted the sowing of rye at a suitable date in autumn, and a late variety which necessitated sowing the rye crop late. After potatoes, the rye was manured with the same amounts of N, P and K given to the oat crop ; where grown after oats, the rye received 200 kg. superphosphate, 100 kg. 40% K salts and 300, 400, or 500 kg. calcium nitrate per ha. Rye and oats receiving the same amount of fertilizer gave respective yields of 26·4 and 25·5 hkg. grain per ha. Medium-early culinary potatoes and late potatoes for fodder or industrial use gave respective dry-matter yields of 67 and 88·3 hkg. dry matter per ha. Rye grown after oats and receiving 300, 400, or 500 kg. calcium nitrate per ac. gave average grain yields of 26·6, 29·1 and 31·2 hkg. per ha. Rye grown after potatoes receiving fertilizer (800 kg. superphosphate, 400 kg. K salts and 600 kg. calcium nitrate per ha.), only, gave an average grain yield of 28·4 hkg. per ha. and yielded 30·4 hkg. per ha. where the potatoes received dung + fertilizer. Rye tended to overwinter better after potatoes than after oats and started growth earlier in the following spring. Rye sown in mid-September yielded 3·1 hkg. grain per ha. more than that sown after late-harvested potatoes at the end of October. Rye sown at the end of October after potatoes gave average grain yields 1·3 hkg. per ha. higher than those sown after oats in mid-September.—P.J.B.

1210† BLENCOWE, J. P. **Investigation of Mallee farming problems at Wanbi Research Centre.** *J. Dep. Agric. S. Aust.* 1955, **58,** No. 9, 344-59 and 378, illus.

The progress of the centre is outlined and mention is made of the current and future research programme. A South Australian commercial rye variety has shown a better early growth than an imported Slav selection and is of greater use for sand-dune stabilization. [See *Fld Crop Abstr.* 8 : 1029.]—M.P.

BARLEY

1211 GORRIE, R. M. **Barley as an irrigated crop in Iraq.** *World Crops* 1955, **7,** No. 6, 238-9 and 249, illus.

1212 COLLIER, D. and GACHON, L. Influence de différéntes conditions de sous-sol de terres noires de Limagne sur l'alimentation minérale, la composition et le rendement d'une orge d'hiver en 1954. [**The effect of different subsoil conditions in black earths of the Limagne on the mineral nutrition, composition and yield of a winter barley in 1954.**] *C.R. Acad. Agric. Fr.* 1955, **4,** No. 6, 263-70, bibl. 2. [Sta. Agron., Clermont-Ferrand]

The winter barley Probsdorf was used in the 1954 trials. Results indicated that shallow soils, well supplied with water, were preferable for good plant growth to deep, dry soils. The amount of water available in the soil influenced the mineral nutrition of the plants. Addition of water by irrigation, 3 days before shooting, brought about a 9 cm. increase in height of the barley in 11 days

and resulted in a 10-12% increase in yield. [See also *Fld Crop Abstr.* 7 : 769 and 770.]—M.P.

1213† CHRISTOPH, R. J. and FISK, Emma. **Responses of plants to the herbicide 3-(*p*-chlorophenyl)-1,1-dimethylurea (CMU).** *Bot. Gaz.* 1954, **116,** No. 1, 1-14, bibl. 12, illus. [Carroll College, Waukesha, Wisconsin and Univ. Wisconsin, Madison] [Received May, 1955]

Barley was treated with the equivalent of 0, 0·25, 0·75 and 2·0 lb. CMU per acre at the 2-leaf, 3-leaf, jointing, booting and pollination stages. Soyabean was treated with 0, 0·5, 1 and 2·0 lb. CMU per acre immediately following planting (pre-emergence), and 3 weeks and 8 weeks after planting (beginning of flowering). The resulting physiological, cytological and morphological changes are described. The outstanding early symptom of CMU-toxicity, particularly in seedlings, is chlorosis which suggests nitrogen deficiency. This chlorosis is evident at first in marginal and superficial tissues and then progresses inwards. CMU at 2 lb. per acre killed about 30% of barley plants when treated at stages of development up to and including early jointing. Soyabean was very susceptible to pre-emergence treatment at rates above 0·5 lb. CMU per acre ; 2 lb. CMU per acre proved lethal to all plants treated before emergence. CMU acts quite differently from the phenoxy herbicides or the carbamates. " The primary action of CMU within the plant appears to involve one or more enzyme systems . The time between application of the herbicide and the response by the plant varies in length, depending in part on soil moisture, precipitation, soil type, and plant species. The retardation of growth and maturation in plants treated with CMU, as shown in the apical meristems and in cambial activity, indicates the involvement of fundamental growth processes, the rates and nature of which are altered by CMU."—D.B.

1214 DUFF, A. D. S. and GILMOUR, J. A. **The treatment of loose smut of barley in Kenya.** *E. Afr. agric. J.* 1955, **20,** No. 4, 225-7, bibl. 2. [Pl. Breed. Sta., Njoro (A.D.S.D.), Egerton Agric. Coll., Dep. Agric., Kenya (J.A.G.)]

Treatment of seed of Glacier barley, which was 100% infected with loose smut (*Ustilago nuda*), with hot water, or Spergon, prior to sowing was effective in reducing the incidence of the disease. Loss in germination capacity of the seed was 2% after treatment with hot water and 50% after soaking in Spergon, but the final crop yield was the same. Rogueing of all infected plants was carried out, the percentage infection being 2·44 and 0·56 from the Spergon and hot-water treated seeds, respectively. Modifications to the treatments used are being tested in order to simplify and improve the methods.—M.P.

1215 WINKLEMANN, A. Untersuchungen zur Bekämpfung des Gersten- und Weizenflugbrandes. [**Experiments in the control of loose smut of barley and wheat.**] *Angew. Bot.* 1955, **29,** No. 1, 3-13, bibl. 20, illus. [Landwirtschaftskammer Westfalen-Lippe, Münster, Westphalia, W. Germany]

A procedure is described whereby a 3-hour treatment with water vapour at 50-53°C. brought about complete control of smut (*Ustilago nuda* and *U. tritici*) on grain of barley and wheat. With alcohol vapour a 2-hour treatment sufficed.—D.B.

1216† FOJIWARA, A. and TSUTSUMI, M. **Biochemical studies of microelements in green plants. 1. Deficiency symptoms of microelements on barley plants and changes of indolacetic acid oxidase activity.** *Tohoku J. agric. Res.* 1954, **5,** No. 1, 47-52, bibl. 6. [Dep. Agric. Chem., Fac. Agric., Tohoku Univ., Japan]

Barley plants were grown in a series of nutrient solutions each deficient in one of the following microelements : Fe, Mn, Zn, Cu, Mo and B. There was a control solution giving complete nutrition. The activity of the enzyme indolacetic-acid (IAA) oxidase was estimated in the root tissues of the barley plants. The results are summarized as follows . The IAA oxidase activity of root tissues in Fe-, Mn-, Zn- and B-deficient plants was almost the same as that of the control plants, although the growth of the deficient plants was depressed. In Cu- and Mo-deficient plants, IAA oxidase activity was very weak (20 and 8%, respectively, of that noted in non-deficient plants). The addition of Cu, but not of Mo, to the appropriate deficient solution restored the level of the IAA-oxidase activity within 5 days. The apparently close relationship between the micro-elements Cu and Mo and the enzyme is discussed.—W.J.B.

1217 GEORLETTE, R. Origine et phylogénie des orges cultivées. [**The origin and phylogeny of cultivated barleys.**] *Ann. Gembl.* 1955, **61,** No. 2, 128-32, bibl. 43. [207, av. R. Neybergh, Bruxelles II]

In this short review article several diverse opinions are quoted on the source of *Hordeum vulgare.*—D.B.

1218 KAMM, A. **The discovery of wild six-rowed barley and wild *Hordeum intermedium* in Israel.** *K. LantbruksHögsk. Ann.* 1954, **21,** 287-320, bibl. 33, illus. [Cereal and Forage Sect., Minist. Agric., Hakirya, Tel Aviv, Israel]

1219 WILLIS, A. J. and YEMM, E. W. **The respiration of barley plants. 8. Nitrogen assimilation and the respiration of the root system.** *New Phytol.* 1955, **54,** No. 2, 163-81, bibl. 28, illus. [Bot. Dep. Univ. Bristol]

1220 ANDERSEN, S. **Relation between leaf number and ear development in spring sown barley and oats.** *Physiol. Plant.* 1955, **8,** No. 2, 404-17, bibl. 8. [Pl. Cult. Dep., Roy. Vet. Agric. Coll., Copenhagen, Denmark]

In trials in Denmark, the effect of sowing rate, soil fertility, sowing date and variety on ear development in barley and oats was studied in the field ; in similar pot trials, the effect of soil moisture, light intensity and day length was also studied. Seed rates were varied from 50-800 kg. per ha. Ear development was advanced by increases in sowing rates ; the effect in oats was small, but in barley considerable. Leaf numbers showed an opposite tendency. Where 50 kg. seed per ha. was used, growth stage 4 [see *Fld Crop Abstr.* 6 : 537] in barley was reached when leaf number was 3·77 ; where 800 kg. of seed was used, the leaf number was much lower at this stage. With oats sown at 50 kg. per ha., stage 3·5 of the panicle was reached with a leaf number of 4·77 ; with a sowing rate of 800 kg. leaf number was 3·77 for a panicle stage of 3·9. Ear development was most advanced in all cases where no N was applied, but the effect of N treatment on ear development was not regarded as important, though significant. Soil moisture deficiency resulted in advancement of ear development, but its effect was small. In sowing date trials, 10 different dates were used, but the effect of this factor on ear development was slight. Examples are given of varietal differences in leaf numbers at given stages of spike development in barley. Errors consequent on the use of leaf numbers for growth analyses are discussed. It was concluded that where plants were grown under conditions deviating to some considerable extent from normal (i.e., winter conditions, short days, culture in greenhouses), leaf number is a poor index of stage of development ; also, conditions conducive to extensive tillering retard ear development and thus introduce a further error in the use of leaf numbers. Errors may also arise from fluctuations in the progressive increase in ear numbers. For a high degree of accuracy, leaf number counts cannot replace ear examination, but under most normal conditions, leaf numbers constitute an easy and valuable index of development where relatively less accuracy is needed.—P.J.B.

1221 CANS, D. La fumure azotée de l'orge. [**The nitrogenous manuring of barley.**] *C.R. Acad. Agric. Fr.* 1955, **41,** No. 5, 215-21, bibl. 2, illus. [Sta. de Maule, Seine-et-Oise]

Replicated trials were carried out from 1941-50 in which 30, 45 and 60 kg. N per ha., as ammonium nitrate, were applied to the brewing barley René Guillemart, which is resistant to lodging. The results showed that although yields were significantly and profitably increased by all rates of N application, maximum profit was obtained with 30 kg. N per ha. N applications lessened the effect of adverse seasons. There was only a slight change in grain composition at all levels, and resistance to lodging was maintained at all levels of N in 9 out of 10 years.—M.P.

1222 AUFHAMMER, G. and FISCHBECK, G. Ergebnisse mehrjähriger Sortendüngungsversuche zu Sommergerste. [**Results of several years' experiments in the manuring of varieties of spring-barley.**] *Z. Acker- u. Pflbau* 1955, **99**, No. 2, 151-82, bibl. 20, illus. [Inst. Acker- und Pflanzenbau, Techn. Hochsch., München-Weihenstephan, Bavaria]

In a 3-year experiment, 11 bred strains of spring-barley for brewing were subjected to 5 different manurial treatments. With N at the rate of 20-40 kg./ha. and heavy applications of P and K there was a 30% increase in yield over the control in years of normal rainfall, but in a dry year the increase was only 6·6%. The effect of the quantity and proportions of fertilizers on the size and shape of the grain, the percentage of husk, protein content and malting properties was studied. In normal weather, heavy manuring was not detrimental to the malting qualities of the grain. While the recently developed varieties (Strengs Franken III, Isaria Nova, Haisa II and Lichtis Astra) were equivalent to the older varieties (Hadostreng and Isaria) in brewing qualities, they were superior in yield and in resistance to lodging and mildew.—D.B.

1223 SOCIÉTÉ D'ENCOURAGEMENT DE LA CULTURE DES ORGES DE BRASSERIE ET DES HOUBLONS EN FRANCE. Rapports sur la campagne 1953. [**Society for the promotion of the cultivation of brewing barley and hops in France. Report for the season 1953.**] [n.d.], pp. 69, illus. [Received March, 1955]

INVESTIGATIONS REPORTED :

1. Trials with varieties and hybrids of winter-barley, p. 13. Damseaux × Probstdorf 3 was consistently superior to Bordia in yield and in threshing qualities. Its protein content was 2% lower than that of Probstdorf.

2. Trials with varieties of spring-barley at Maule, pp. 19-23. Albert Busser is still the best variety of brewing barley. Bonus gave good results and Carlsberg II should be further investigated because of its heavy grain and low protein content.

3. Manurial trials at Grignon, pp. 33-5. These trials have been removed to a new location, but continuity has been maintained by employing the same varieties (Aurore, A. Busser and Rika) and the same levels of N-manuring (30, 45 and 60 kg. N/ha.). Aurore and A. Busser reacted similarly, giving an increase in grain yield for N applications at the 30 and 45 level, but the further addition of N was apparently absorbed in the straw. Rika behaved differently ; the increase in grain yield as

a result of N application was lower than in Aurore and A. Busser up to the 45 level, but it continued to increase up to the 60 level. The increase in the weight per 1000 grain was greater in Aurore and A. Busser than in Rika.

4. Regional trials, pp. 36-7. These were conducted over a wide area : Bretagne, Mayenne, Berry, Beauce-Gatinais, Ile-de-France, Champagne, Lorraine and Alsace . In 1953, yields were satisfactory both as regards quantity and quality. Rika gave the highest average gross yield with 3345 kg. [per ha.] and was followed, in this order, by Aurore, Haisa II, A. Busser and Isaria.

5. Quality of barley of the 1953 harvest, pp. 39-42. For the third year in succession, Albert Busser has proved to be the best malting barley, having the highest carbohydrate and lowest protein content. The properties of the barleys harvested from the different regions and the results of malting trials are tabulated.—D.B.

MAIZE

1224† Lacroix, L. La culture du maïs. [**Maize cultivation.**] *Rev. Agric., Brux.* 1955, **8,** No. 4, 440-69, illus. [Sta. Phytotechnie, Gembloux, Belgium]

The results of 3 consecutive years of cultivation trials with cob- and fodder-maize are summarized in tables and graphs. Cob-maize. A population density of 70,000 plants per ha., in rows 70-80 cm. apart gave the best yields . Cob-maize was also grown in association with one each of the following forage legumes : lucerne, red clover, white clover and lupin. The legumes were sown as an undercrop between the maize rows (100 cm. apart) and at 3 stages of maize growth, viz. the 4-, 6-, and 8-leaf stage. Early sowing of the legume (2 June) resulted in a good crop of the legume but at the expense of the maize yield. This latter was depressed (compared with pure maize stands) 35%, 16%, 10% and 10%, respectively, by lucerne, white clover, red clover and lupin. The diminution in maize yield was less noticeable when legumes were sown later, 17 June and 2 July. It was difficult to assess whether the yield of the forage legume compensated for the extra cultivation costs and the reduction in maize yield. When peas were sown as the undercrop, the financial returns were the same as for a pure stand of maize ; with beans there was a gain of 4500 fr. (Belgian) [per ha.]. Fodder-maize. These experiments were concerned only with maize harvested at the milk stage. Green-weight increased with population density (8, 12 and 16 plants per m^2.) and inversely with distance between rows (50, 75 and 100 cm.), though this latter factor has little statistical significance. The percentage of dry matter in the entire plant is but little influenced by population density. In dense populations the quantity of dry matter per ha. in the total yield and from stems [and leaves] is high, while that contributed by the ears is lower. A mixed cultivation consisting of forage legumes sown between the rows of maize is a possibility, but financial returns are uncertain. The correct date for sowing the legume has not yet been established. —D.B.

1225 Schaller, F. W. and Larson, W. E. **Effect of wide spaced corn rows on corn yields and forage establishment.** *Agron. J.* 1955, **47,** No. 6, 271-6, bibl. 4, illus. [Iowa Agric. Exp. Sta., Ames]

The studies reported were carried out at different locations in Iowa during 1952-4. Maize was grown in rows 40 or 80 in. apart, or in rows 40 in., alternating with 80 in., apart. Plant populations of 16,000 per ac. were aimed at in 40 in. rows and 12,000 per ac. in 80 in. rows. Forage crops sown were mostly lucerne/grass mixtures and sowing dates were late June or early July. Maize yields where rows 80 in. apart were used were 20-25% below those where 40 in. rows were used. There was evidence that plant populations where 80 in. rows were used should not drop below 25% less than those thought suitable for 40 in. rows. Forage crop establishment was better in 80 in. than in 40 in. maize rows and best results followed the use of the 80 in. spacing, rather than the 40-80 in. alternate spacing. Forage crop stands were best when sown at the same time as the maize, but this markedly reduced maize yields. The best time for sowing forage crops in maize appeared to be early June and a recommended practice was to sow the maize as early as possible, cultivate twice, and sow the forages in mid-June. Rainfall in July and August was critical for the survival of the forage crops.—P.J.B.

1226 Sanchez, B. and others. Experiencias con fertilizantes en suelos gallegos. 2. Influencia de la densidad de siembra y de la fertilización sobre la producción y el contenido en proteína del grano de maíz. [**Experiments with fertilizers in Gallician soils. 2. Influence of manuring and density of sowing on the protein content and total yield of maize grain.**] *An. Edafol. Fisiol. veg.* 1955, 137-60, bibl. 7, illus., English summary p. 159.

1227 Bringman, K. and Kaiser, H. Maisstreifen als Windschutz. Meteorologische Untersuchungen und Ertragsfeststellungen auf dem Gut Grafenthal (Sinsteden) bei Goch, Niederrhein. [**Maize strips as windbreaks. A meteorological investigation and a determination of yields on the Grafenthal Estate, near Goch, Niederrhein.**] *Z. Acker- u. Pflbau* 1955, **99,** No. 3, 321-34, illus. [Mülheim/Ruhr, W. Germany]

Sugar-beet was the test crop grown between the rows of maize. In a study of the microclimate surrounding the sugar-beet crop, measurements were made of wind force, evaporation, temperature and moisture-content of the air. The modifying effect of the maize strips on the elements of the microclimate are recorded in graphs, and further experiments are in progress. The effect of the maize strips was to increase the yield of sugar-beet. In these experiments, yield increases of 50% were recorded but it was recognized that these figures may be unduly high, owing to the, possibly, more favourable soil of the control plots. Since the maize strips occupied 20% of the area of the beet field, 20% of the beet harvest was lost. The actual increase in beet yield resulting from protection by maize strips was that obtained over and above a 20% increase. The experience gained from these experiments directs attention to the need for careful selection of sites for the test and control crops and for a large number of samples, at least 16, to determine the yield of the controls.—D.B.

1228 RIJKSINSTITUUT VOOR RASSENONDERZOEK VAN LANDBOUWGEWASSEN, NETHERLANDS. Bericht over rassenkeuze No. 185. Mais, 1955. [**Choice of varieties. Pamphlet No. 185. Maize, 1955.**] *Suppl. 6. Landb-Voorl.* 1955, **12,** No. 3, 1-3. [Wageningen]

In 1954, the area in the Netherlands devoted to maize for grain amounted to 9100 ha., chiefly in Brabant and North Limburg. The results of regional trials in 1948-54 with numerous varieties, classified as early, medium-early, medium-late and late, are tabulated. No variety consistently outyielded Goudster (a medium-early variety) which occupied 70% of the area under maize grown for grain.—W.J.B.

1229 LINDEMANN, E. Die Eignung deutscher Maissorten für die Stärkegewinnung. [**The suitability of German maize varieties for the starch industry.**] *Züchter* 1955, **25,** No. 4/5, 129-32, bibl. 5. [Bundesforschungsanstalt für Getreideverarbeitung, Detmold, W. Germany]

In the West German Republic, 200,000 tons of maize are used annually for the manufacture of starch. Most of it is imported. Four German varieties of maize were compared with seven foreign varieties for starch yield and other properties required by the starch industry. Pfarrkirchner Körnermais and Gelber badischer Landmais gave high starch yields and possessed suitable properties for the manufacture of starch. Chiemgauer Körnermais was less suitable and Mahndorfer Körnermais unsuitable.—D.B.

1230 REYES, P. and others. Maíz híbrido para tierra caliente. Rocamex H-501, H-502 y H-503. [**Hybrid maize for tropical areas. Roxcamex H-501, H-502 and H-503.**] *Foll. Divulg. 18. Prog. Coop. Agric. Sec. Agric. Ganad. Mex. Fund. Rockefeller* [n.d.], pp. 38, illus., English summary pp. 37-8.

In extensive trials in Mexico, the 3 varieties of hybrid maize, Rocamex H-501, H-502 and H-503, yielded 20-25% more than the common open-pollinated varieties in all the tropical regions in which they were tested, except in non-irrigated plantings in the very dry region of the Isthmus of Tehuantepec.—W.J.B.

1231 HARPER, J. and others. **The influence of environment on seed and seedling mortality. 1. The influence of time of planting on the germination of maize.** *New Phytol.* 1955, **54,** No. 2, 107-31, bibl. 8, illus. [Dep. Agric., Oxford]

Maize grains exposed in soil to low temperatures (5°C. for 10 days or 8°C. for 8 days) and subsequently transferred to a higher temperature to allow rapid germination, suffer a heavy mortality. This mortality is caused mainly by soil-borne pathogens, and is almost entirely prevented by soil sterilization or treatment of the grain with a fungicidal dust. Surface sterilization of grains is completely ineffective. The extent of this mortality differs very markedly between dates of soil sampling and these differences are partly correlated with the moisture content of the soil. However, even after allowance has been made for this influence of moisture, there remain highly significant variations between sampling dates. The 'pathogenic potential' of the soil varies therefore with time and moisture content of the soil. Mortality is greatest when the content of soil moisture is high, but the proportion of this mortality which occurs in the post-germination phase is higher in the drier soil samples.—Authors' summary.

1232 GOODSELL, S. F. and others. **The effect of moisture and temperature during storage on cold test reaction of *Zea mays* seed stored in air, carbon dioxide, or nitrogen.** *Agron. J.* 1955, **47,** No. 2, 61-4, bibl. 11. [Pioneer Hi-Bred Corn Co. Lab., Johnston, Iowa]

The trials reported were carried out on samples of commercially-produced hybrid seed classified as strong and weak on the basis of cold tests. The seed was stored for 9 months before the trials were started and then treated so as to adjust its moisture content to 8, 10, 12 or 14%. The seed was treated with 0·3 oz. Thiram per bu. and stored at 0, 40, 60 or 85°F. in air, CO_2, or nitrogen for up to 5 years. Samples were taken every 6 months during the storage period and subjected to normal germination procedures at 80°F., or to cold test procedures, as follows : the seed was placed embryo down on a 0·25 in. layer of sub-irrigated, non-sterilized field

soil and held at 50°F. for 7 days, before being removed to 80°F. for 4 days. In most cases, germination by normal procedure gave values of 95% after 5 years' storage at moisture contents of 8, 10 and 12% and in temperatures of 0°F. and 40°F. and at moisture contents of 8 and 10% in a temperature of 60°F. Seed with 12 or 14% moisture content stored at 60°F. and with 8 or 10% moisture content stored at 85°F. deteriorated rapidly after storage for 1 year. As shown by germination under cold test conditions, seed with 8 or 10% moisture content stored at 0 or 40°F. for 5 years had a germinating capacity similar to that at the start of the trials. Seed with 12% moisture content stored at 0°F. suffered only a slight reduction in germination, but a significant reduction when stored at 40°F. for 5 years. All samples suffered a significant reduction in germination when stored at 85°F. for 6 months. The cold test germination of samples stored in nitrogen or CO_2 was, in most cases, no better than where air was used. At moisture contents above 10% and high storage temperatures, the weak hybrid seed was slightly more susceptible to pathogens under cold test conditions than the strong seed. Fungicidal treatment was relatively less effective for protecting seed stored at high moisture contents and storage temperatures.—P.J.B.

1233 LACROIX, L. and DETROUX, L. Essais de désherbage chimique des cultures de mais. [**Herbicide trials in maize cultivation.**] *Rev. Agric., Brux.* 1955, **8,** No. 2, 170-84, bibl. 2, illus. [Sta. Phytopharmacie de l'État, Gembloux, Belgium]

Two series of trials were conducted simultaneously on adjacent stands of maize to test the effect of herbicides on (a) maize alone, the stand being kept free of weeds by hoeing, and (b) the weeds in a maize stand. As a result of these trials the following recommendations were made : (1) weeding should be done between rows shortly after emergence of the maize crop ; (2) spraying of maize with one of the dye group of herbicides, preferably DNBP, should be carried out when the crop is about 10 cm. high ; (3) weeds resistant to the dye type of herbicide should be controlled by applying one of the phytohormones, preferably the Na salt of 2,4-D, at the rate of 1 kg./ha. active substance.—D.B.

1234 ILNICKI, R. D. **Critical periods in the application of 2,4-D to corn.** *Diss. Abstr.* 1955, **15,** No. 6, 928-9. [Ohio State Univ.]

High rates of treatment with 2,4-D reduced grain yields of maize following treatment at several growth stages, the effects being more marked where the isopropyl ester, rather than the amine salt, was used. Stalk bending, leaf roll, reductions in leaf width and temporary stunting were induced where conditions favourable to rapid growth, with high air temperatures and high soil moisture contents, prevailed. Stalk brittleness was most marked following treatment at the 3- to 9-leaf stages, particularly where soil moisture contents were high. Fasciation of brace roots was noted following treatment at the 6- to 9-leaf stages. Onion-leaf deformity was noted where maize at an early growth stage was treated and rain fell immediately after 2,4-D application. It was concluded that there was no growth stage up to the first 6 weeks of growth at which 2,4-D was notably deleterious to maize plants, but that where such environmental conditions as high soil moisture contents and high air temperatures, causing rapid growth existed, 2,4-D could cause severe injury at any growth stage within this period.—P.J.B.

1235 VENGRIS, J. and others. **Plant nutrient competition between weeds and corn.** *Agron. J.* 1955, **47,** No. 5, 213-16, bibl. 6. [Massachusetts Agric. Exp. Sta., Amherst]

Recently, the view has been put forward in certain quarters that clean cultivation of maize is unnecessary, and perhaps not even desirable. By using a mulch planter, the usual operations of ploughing, discing and harrowing for seed-bed preparation can be eliminated. Higher rates of manurial treatment are considered necessary to supply the needs of both weeds and maize. In view of doubts as to whether additional manurial treatments could supply the need of crops growing in association with weeds, the studies reported were carried out to obtain quantitative data on crop/weed competition, with particular regard to P supplies. In field trials, maize was grown alone and in combination with different weed species, including *Amaranthus retroflexus, Digitaria sanguinalis, Echinochloa crus-galli* and *Chenopodium album.* The plots received 150 lb. N + 150 lb. K_2O per ac. one month before sowing, with an additional application of 50 lb. each of N and K_2O one month after sowing. Lime was applied to raise the soil pH to 6·2 and different P treatments, including nil, 50 and 200 lb. P_2O_5 per ac. as superphosphate were given. Responses to P by all species were very marked in the seedling stages ; among the weeds, *A. retroflexus* showed the greatest response. In 1952, both maize alone and maize with weeds responded to P, but the grain yield of maize, growing with weeds was significantly lower than that of maize alone. In 1953, responses to P were more pronounced than in 1952. On plots given no P, *A. retroflexus* made very poor growth, but maize yields on such plots were higher than on plots receiving 50 or 200 lb. P_2O_5 per ac. where weeds were present. In 1953, soil moisture was a severe limiting factor, which was thought to be largely responsible for the relatively good yields on plots receiving no P and on which weed competition was very small. The P content of maize plants

varied only slightly as rates of P treatment increased ; the P content of *Ch. album* and *A. retroflexus* and, to some extent, *D. sanguinalis*, increased markedly as rates of P treatment increased. From these results, the feasibility of maintaining high maize yields in the presence of competing weeds by means of increasing the rate of manurial treatment is strongly questioned.—P.J.B.

1236 HEMINGWAY, J. S. **Effects of *Puccinia polysora* rust on yield of maize.** *E. Afr. agric. J.* 1955, **20,** No. 3, 191-4, bibl. 13. [Overseas Fd Corp., Tanganyika]

The incidence of *Puccinia polysora* rust on the maize crop has been studied at Nachingwea. It has been shown that the initial infection takes place at progressively earlier stages on later plantings, spreading from adjacent established epidemics, but once the initial infection has occurred, the rate of increase in any planting is uniform. The losses in yield due to rust infection are heavy. They have been estimated by the use of a blanket fungicide treatment, and by comparison of early- and late-planted plots. The lower yield is a result of a reduced number of cobs per plant, and a considerable reduction in the individual seed weight. The incidence of the rust has no effect on the carbohydrate/protein ratio in the seed.—From author's summary.

1237 POND, D. D. **Insecticides against the corn earworm in New Brunswick.** *J. econ. Ent.* 1955, **48,** No. 2, 198-9. [Fld Crop Insect Sect., Ent. Lab., Fredericton, N.B.]

A light to medium infestation of corn earworm (*Heliothis armigera*) on maize may be satisfactorily controlled with mineral oil, 5% DDT dust, 3% DDD dust or 40% Ryania dust. A single application of 3% DDD dust gave significant control of a heavy population in 1951. But 2 applications of this dust against a heavy population in 1952 failed to give economic control.—From author's summary.

1238 HEMBERG, T. **Studies on the balance between free and bound auxin in germinating maize.** *Physiol. Plant.* 1955, **8,** No. 2, 418-32, bibl. 28. [Bot. Dep., Roy. Pharm. Inst., Stockholm, Sweden]

1239 GAUSMAN, H. W. and DUNGAN, G. H. **Some effects of certain plant growth substances on maize.** *Bot. Gaz.* 1954, **116,** No. 1, 29-40, bibl. 9, illus. [Illinois Agric. Exp. Sta., Urbana] [Received May, 1955]

The effect of 2,4-D, IAA, NAA and TIBA at concentrations classed as very high, high, medium, and low, applied to single-cross hybrids of maize at 4 stages of development was studied. Records are tabulated of delayed anthesis and silking, number of tillers, number of ears per plant, yield, shoot development and morphological changes.—D.B.

1240 HASKINS, F. A. **Changes in the activities of several enzymes during germination and seedling development in corn (*Zea mays* L.).** *Pl. Physiol.* 1955, **30,** No. 1, 74-8, bibl. 19. [Univ. Nebraska, Lincoln]

1241 HORI, S. **Formation of starch in storage organs. 2. The starch formation in maize kernel.** *Bot. Mag., Tokyo* 1954, **67,** No. 795-6, 228-32, bibl. 22, illus.

1242 HUNTER, A. S. and YUNGEN, J. A. **The influence of variations in fertility levels upon the yield and protein content of field corn [maize] in Eastern Oregon.** *Proc. Soil Sci. Soc. Amer.* 1955, **19,** No. 2, 214-18, bibl. 7. [Oregon Agric. Exp. Sta., Corvallis]

1243 GONZALEZ, O. Cosecha mecanizada de maíz a diferentes niveles de humedad. [**Mechanical harvesting of maize at different grain-moisture contents.**] *Agron. trop., Maracay* 1954, 3-12, bibl. 4, English summary p. 12. [Cent. Invest. Agron., Maracay, Venezuela]

Plots with cobs having a moisture content of 30, 25, 20 and 15% were combine-harvested. The best yield in relation to the costs of operation was obtained with cobs having moisture contents of 25 and 30%, because of the time saved in harvesting and the larger percentage of grain harvested : maize bearing grain with a relatively low moisture content of 20 or 15% was heavily infested with weeds, because it had stood longer in the field. Cobs with 30% moisture content were difficult to dehusk. The optimum level of moisture content for combine-harvesting was thus 25%.—W.J.B.

1244 POSADA, L. Efectividad de cuatro insecticidas en la protección de granos de maíz almacenado contra los "Gorgojos" (*Sitophilus oryzae L.*). [**Effectiveness of four insecticides in the protection of stored maize grains against rice weevil (*Sitophilus oryzae*).**] *Acta agron., Palmira* 1955, **5,** No. 1, 29-50, bibl. 13, illus., English summary pp. 47-8.

A comparative study was made of the effectiveness of DDT, Marlate, Verindal and Pyrenone for protecting stored maize grain. All the insecticides except Marlate gave good control of weevils. Pyrenone gave good control at first but had a poor residual effect. Verindal, which gave the highest kill of weevils (100%) appeared to reduce seed viability. The germination of the stored grain after treatment with Marlate, DDT, Pyrenone and Verindal and with no insecticidal treatment (control), respectively, was 73, 66, 66, 65 and 74%.—W.J.B.

SWEET-CORN

1245 MAYWALD, Eileen and others. **Constituents of corn. Development of starch and phytoglycogen in golden sweet corn.** *J. agric. fd Chem.* 1955, **3,** No. 3, 521-3, bibl. 8. [George M. Moffett Res. Labs, Corn Products Refining Co., Argo, Ill.)

The studies reported had as their main objects : (a) the isolation and characterization of the starch and phytoglycogen fractions in sweet-corn, (b) tracing the production of these components during maturation and (c) the determination of the cause of curdling in sweet-corn during canning. Samples of grain were taken from plants in the completely immature stage (white, incompletely developed kernels) to the over-mature stage (kernels full yellow in colour). During this period, the starch content increased from 8 to 15% of the dry kernel weight, while the phytoglycogen content increased from 7 to 31% of the dry kernel weight. Heat-coagulable protein decreased progressively in content from 4% to 1% in the over-mature samples ; during the process of drying, the protein was apparently converted to a gluten-like type. Green sweet-corn appeared to offer a very convenient laboratory source of undegraded glycogen with low protein content.—P.J.B.

SORGHUM AND MILLET

1246 EVANS, M. **Precipitation and sorghum yields.** *Pr. Bull. 1069. N. Mexico agric. Exp. Sta.* 1952, pp. 6. [Received Aug., 1955]

Precipitation records from 14-17 weather stations in countries on the eastern border of New Mexico were analysed during 1940-51 to determine whether relationships between precipitation and yields of grain and forage sorghums and broomcorn could be demonstrated. In the 12 crop-years analysed, precipitation was 36% above the 12-year average in 5 years and grain sorghum yields were 39·2% above the 12-year average in these years ; in 7 out of 12 years, precipitation was 26% below the 12-year average and grain sorghum yields 26·5% below average. In 11 out of 12 years, grain sorghum yields varied directly with precipitation ; in the case of forage sorghum and broomcorn, yields varied directly with precipitation in 8 and 10 years, respectively, out of 12. Grain sorghum and broomcorn yields showed little relation to autumn and winter precipitation. Precipitation in the period March to May was closely related to yields of all three crops ; precipitation in April was more closely related to yields than that of March or May. Precipitation in June and July was also closely related to yields. Where precipitation in spring and early summer was adequate, yields were largely independent of precipitation in August and September.—P.J.B.

1247 MISRA, S. K. **Jowar [sorghum] too responds to Japanese method.** *Indian Fmg* 1954, **4,** No. 8, 14-15, illus.

An account is given of the high yields of grain obtained in Madhya Pradesh from sorghum (variety Saoner) by means of heavy organic and artificial manuring, followed by careful cultivation to control weeds. Yields of 5968 lb. grain per ac. on an irrigated area and 6288 lb. on an unirrigated area, were obtained.—W.J.B.

1248 BURKHARDT, C. C. and BREITHAUPT, M. P. **Chemical control of the corn earworm in sorghum heads.** *J. econ. Ent.* 1955, **48,** No. 2, 225, bibl. 1. [Kansas Agric. Exp. Sta., Manhattan]

OS-2046, at 0·5 lb. of actual toxicant per ac., gave 96 and 100% control, and DDT, at 2·75 lb. per ac., 84 and 95% control, after 24 and 96 hr., respectively.—From authors' summary.

1249† SNOWDEN, J. D. **The wild fodder *Sorghums* of the section *Eu-Sorghum.*** *J. linn. Soc., Lond.* 1955, **55,** No. 358, 191-260, illus.

A revision of the species in the section *Eu-Sorghum* of the genus *Sorghum* has been made in order to facilitate the identification of the material from North-east, Central and East Africa. After an account of the general taxonomic characters of the wild species of the section *Eu-Sorghum,* (which includes a note on the poisonous properties of the young immature plant), a key is given to the subsections *Arundinacea* and *Halepensia* and the species they contain. There are illustrated descriptions of 21 species together with accounts of the history of their nomenclature, their diagnostic characters and affinities, distribution and utility. The descriptions are based on dry herbarium specimens, amplified by information from collectors' notes.—D.B.

1250 ROD, J. and VŘESKÝ, F. Vyšetřování světelného stadia různých odrůd čiroků. [**The photoperiodic phase in different varieties of sorghum.**] *Sborn. čsl Akad. Zeměd.* (*Ann. Acad. csl. Agric.*) *Ser. Pl. Prod.* 1955, **28,** No. 1, 21-32, bibl. 26, illus., English summary p. 32.

In an experiment in which five late and three semi-late varieties of sorghum (*Sorghum vulgare* var. *saccharatum*) were used, the day was shortened to 4 and 8 hr. during 16 and 32 days. Assuming that this crop is a short-day plant, the test was designed to obtain types with earlier flowering and seed ripening for crossing with early varieties and to obtain information on the photoperiodic threshold of the varieties used. Ear emergence (the most reliable feature indicating reaction to photoperiod) is accelerated by an 8-hour day during 32 days. The photoperiodic threshold of most var-

ieties is within the limits of 16 to 32 days after germination.—From English summary.

1251 PANDYA, P. S. and CHAVAN, V. M. **A brief note on research work done on bajri (*Pennisetum typhoideum*) in Bombay State.** *Poona agric. Coll. Mag.* 1954-5, **45,** No. 3-4, 123-4, bibl. 3.
Research work in Bombay State on *Pennisetum typhoideum*, which occupies 5,700,000 ac. in the State, is described. An account is given of various improved varieties for different areas. As a result of experiments it is stated that the best results were obtained with manurial applications of 60 lb. N and 40 lb. P_2O_5 per ac. plus farmyard manure. A seed rate of 4 lb. per ac. is recommended.—W.J.B.

1252 PANDYA, P. S. and CHAVAN, V. M. **A brief note on research work done on small millets in the Bombay State.** *Poona agric. Coll. Mag.* 1954-5, **45,** No. 3-4, 125-6, bibl. 4.
Improved varieties of *Eleusine coracana, Setaria italica, Paspalum scrobiculatum* and *Panicum miliaceum* are mentioned. Brief notes are given on manurial experiments with *Eleusine coracana*.—W.J.B.

1253† PATHAK, A. N. **Effect of manurial treatments on : (4) recovery of nitrogen in crops.** *J. Soil Wat. Conserv., India* 1954, 20-4, bibl. 19.
Seeds of *Panicum crus-galli* var. *frumentaceum* were grown in soils treated with (a) ammonium sulphate, (b) compost and (c) farmyard manure. There was a control (d) no treatment. It was observed that the rate of growth of plants in soil receiving farmyard manure was greater than in soils treated with compost and ammonium sulphate. The yield of grain and straw with different treatments was in the following order (a)>(c)>(b)>(d). The nitrogen contents of the grain with different treatments were in the order (a)>(b)>(c)>(d). With different treatments, the amounts of total N recovered in the crops were in the order (a)>(c)>(b)>(d). —From author's summary.

RICE

1254 AGRICULTURAL COLLEGE AND RESEARCH INSTITUTE, HEBBAL, BANGALORE. **Importance of improved strains of paddy in the 'Grow More Food' campaign.** [n.d.], pp. 13. [Received April, 1955]
Rice varieties are recommended for sowing in the various rice-growing areas of Mysore. The varieties are divided into 3 main groups according to their suitability for transplanting in : (1) July-August ; (2) January-February ; (3) July in the heavy rainfall areas of Malnad. There are notes indicating the appearance, growth habit, duration of the period transplanting-to-harvesting and the grain type of each variety recommended.—W.J.B.

1255 BOLLICH, C. N. and WALKER, R. K. Pruebas varietales sobre arroz de secano y de regadio realizadas en Venezuela en 1953. [**Varietal trials on irrigated and unirrigated rice in Venezuela in 1953.**] [n.d.], pp. 16. [Inst. IBEC Invest. Tec. Venezuela] [Received 1955]

1256 KAUFMAN, P. B. **Histological responses of the rice plant (*Oryza sativa*) to 2,4-D.** *Amer. J. Bot.* 1955, **42,** No. 7, 649-59, bibl. 19, illus. [Dep. Bot., Univ. California, Davis]
Oryza sativa is susceptible to 2,4-D used as a herbicide in rice fields. The present study records new details regarding the effect of 2,4-D on the anatomy of leaf and stem. Leaves of plants (13-111 days old) cultured from caryopsides were treated with the triethanolamine salt of 2,4-D at a rate of 24 oz. 2,4-D acid equivalent in 10 gal. water per acre. After treatment, the plants were subjected to a temperature of about 32°C. to ensure development of the aberrations. These included : activity of meristems at the leaf margin ; the formation of tubular leaves from a single leaf primordium ; accelerated cellular differentiation in young stems and leaves ; precocious lengthening of young internodes located just below the shoot apex ; prolific development in older internodes of adventitious roots which became massive and confluent and developed tumour-like structures. Tumours also developed in internodes and axillary buds.—D.B.

1257 GHOSH, B. N. **Studies on the physiology of rice. 7. Effects of varying water levels on growth of rice in relation to nitrogen absorption.** *Proc. nat. Inst. Sci. India* 1954, **20,** No. 4, 371-87, bibl. 13, illus. [Dep. Bot., Calcutta Univ.]
An account is given of an experiment carried out in 1934-5, in which a study was made of the effects of varying water levels on the growth, yield and nitrogen content of two early-maturing varieties of rice (Kataktara and Bhutmuri) and one late-maturing variety (Bhasamanik). The following watering treatments were applied 6 days after the seedlings were transplanted into pots kept in outdoor concrete tanks : (a) tank completely drained ; (b) water level at soil level in the pots ; (c) water 3 in. above soil level in pots ; (d) water 6 in. above soil level in pots. The pots were immersed in water at the time of transplanting. The number of tillers, total leaf area, total dry-matter weight and grain yield per plant were greater in treatment (b) than in treatment (a) but thereafter gradually decreased with the progressive rise in water level above soil level. The ratio grain-weight-per-plant/whole-plant-weight was highest with treatment (b) in the case of the 2 early varieties, but in the case of Bhasamanik it was highest with treatment (d).

Plant height and individual leaf area increased with increasing height of water level . Both N content in the root and dry weight of root decreased with increasing height of water level but the N content in the stem and leaf was highest with treatment (d). As a result of the experiments the authors recommend the following water regime for rice-growing : 2-3 in. water in the field for 2 weeks after transplanting, followed by drainage and maintenance of the soil in the puddled condition for a further 5-6 weeks in the case of early-maturing varieties or 7-8 weeks in the case of late-maturing varieties.—W.J.B.

1258 SIRCAR, S. M. and GHOSH, B. N. **Studies on the physiology of rice. 8. The effects of low and high temperature germination with or without short days on summer and winter varieties.** *Proc. nat. Inst. Sci. India* 1954, **20,** No. 4, 452-65, bibl. 21. [Dep. Bot., Calcutta Univ.]

The effects were investigated of high and low temperature during seed germination, with or without subsequent exposure of the seedlings to short days, on the tillering, plant height, leaf number, date of ear emergence, number of fertile and empty spikelets, and grain yield per plant of early-maturing (summer) and late-maturing (winter) varieties of rice. The early-maturing varieties Charnock, Panbira, Kataktara and Dhairal and the late-maturing variety Rupsail were used. The treatments, applied singly and in different combinations were : (a) sprouted unsplit seeds held at 35°C. for 10 and 20 days before sowing, (b) exposure of the one-week-old seedlings to 8-hour daily photoperiods for 4 weeks, (c) sprouted unsplit seeds held at 10°C. for 5 days before sowing (applied to Rupsail only), (d) controls, no vernalization of the seeds and natural daylength. The early-maturing varieties were sown on 6-19 April and the late-maturing variety on 3-17 July. In the case of the early-maturing varieties, high-temperature seed treatment accelerated flowering slightly and short days delayed flowering compared with controls. Short days, compared with natural daylength, induced markedly early flowering of the main shoot in the late-maturing variety, reducing the period sowing-to-flowering from 127 to 62 days ; when short-day treatment was preceded by vernalization of the seed at a low temperature, (c), flowering was accelerated in the first and second tillers as well as in the main shoot. The seed-vernalization treatments alone had no apparent effect on the flowering of the winter variety. The number of leaves on the primary shoot, in the case of the late-maturing variety, decreased significantly with acceleration of flowering caused by the application of (b) or (b) and (c), but, in the case of the early-maturing varieties, the number of leaves on the main shoot was increased in association with the retardation of flowering caused by the application of short days. The application of short days, with or without low temperature treatment, reduced plant height, main-stem length and grain yield in both early- and late-maturing varieties. This reduction in grain yield was associated with a decrease in the percentage of fertile spikelets in early-maturing varieties and with a decrease in the total number of spikelets and in ear-length in late-maturing varieties. In general, the various treatments, compared with controls, did not reduce the number of tillers per plant. In the case of the late-maturing variety, Rupsail, there was a tendency for the number of tillers per plant to increase with the application of short days, with or without pre-sowing low temperature treatments.—W.J.B.

1259 FUJIWARA, A. and OJIMA, K. **Physiological studies of plant roots. 1. Influences of some environmental conditions on the growth of isolated roots of rice plant and wheat.** *Tohoku J. agric. Res.* 1954, **5,** No. 1, 53-61, bibl. 5, illus. [Dep. Agric. Chem., Fac. Agric., Tohoku Univ., Japan]

The effect of thiamine, pyridoxine and nicotinic acid on the growth of excised root tips of rice and wheat (growing in a liquid medium) was tested. The addition of either thiamine or pyridoxine accelerated the growth of excised rice roots ; in the case of excised wheat roots the most marked accelerated growth was obtained by the use of pyridoxine. Excised plant roots attached to their scutella, grew much longer than the root tips mentioned above and showed no reaction to the absence of the vitamins. As sources of carbohydrates in the medium, both glucose and sucrose had similar effects on the growth of excised rice roots (giving optimum results at 0·1 and 0·2 molecular normal solutions) but for wheat roots glucose was the more effective, the most suitable concentration being a 0·1 molecular normal solution. The optimum H-ion concentration in the media was pH 5·0 for wheat and pH 5·5 for rice roots. The optimum temperatures for the growth of the excised roots were 25° and 20°C. for rice and wheat, respectively. Continuous illumination with fluorescent lamps had injurious effects on the growth of the roots.—W.J.B.

1260 NONAKA, F. **Biochemical changes of the lower parts of rice stems whose leaf blades were cut off at different stages of growth. Part II. Seasonal changes of carbohydrate and nitrogen contents. Part III. Paper chromatographic studies on the free amino acids and sugars.** *Sci. Bull. Fac. Agric. Kyushu* 1955, **15,** No. 2, 171-86, bibl. 34, illus., English summary pp. 177 and 185-6. [Fac. Agric., Kyushu Univ., Japan]

1261 PONNAMPERUMA, F. N. **The chemistry of submerged soils in relation to the growth and yield of rice.** *Diss. Abstr.* 1955, **15,** No. 6, 931-2. [Cornell Univ., Ithaca, N.Y.]

In the trials reported, a range of reducing potentials in soils was induced by using soil pH values of 4·9, 5·7 and 6, organic matter levels of nil, 0·2, and 0·4% in the soil, produced by the addition of oat straw, and three drainage regimes, including good soil drainage, submerged culture with vertical drainage at a rate of 0·4 in. per day, and submerged culture with no drainage. The submerged culture with no drainage treatments, using a soil pH value of 4·9, resulted in extremely high concentrations of Fe and high concentrations of Mn in the soil solution, causing symptoms associated with " mentek " disease in rice plants, as found in Java. At the two higher pH levels and where oat straw was added to the soil, the high Fe and Mn concentrations were also noted, but the injurious effects on the plants were of short duration. Best rice yields were associated with no oat-straw treatment, submerged culture and soil pH values of 5·7 or 6. Under these conditions, the soils were characterized by high redox potential, high nitrate and low Fe and Mn concentrations during the first 4 weeks of plant submergence. It was suggested that symptoms characteristic of " mentek " disease in rice could be caused by low soil pH, high soil organic matter and no drainage, which could be remedied by subsoil drainage, delayed rice submergence and the application of sodium nitrate. Combinations of near-neutrality pH values, the presence of soil nitrate and low soil organic matter contents and the absence of drainage, were considered conducive to high rice yields ; under upland conditions, low pH values were considered favourable to high yields.—P.J.B.

1262 DE, P. K. and DIGAR, S. **Influence of the rice crop on the loss of nitrogen gas from waterlogged soils.** *J. agric. Sci.* 1955, **45,** Pt. 3, 280-2, bibl. 2, illus. [State Agric. Res. Inst., W. Bengal]

1263 HAYNES, D. M. **Investigations into the mechanical collection and baling of padi straw during the 1953-54 harvest.** *Malay. agric. J.* 1955, **38,** No. 1, 27-37, bibl. 2, illus.

Trials with a tractor-mounted buckrake and with standard makes of balers were carried out in 1953-4 to assess the suitability of the equipment for Malayan conditions and to determine the cost of baling.—W.J.B.

GENERAL

1264 SHIER, F. L. and REEVES, J. **Cereal variety trials. Results for 1954-55 season.** *J. Dep Agric. W. Aust.* 1955, **4,** No. 2, 205-12, illus

Results obtained in the previous year have beer confirmed for wheat, oats and barley. [See *Fl Crop Abstr.* 8 : 9 and 395.] The oat variety Orient consistently outyielded Ballidu ; W.29 has beer named Avon and released for general cultivation The 6-row barley variety Beecher yielded slightly less than Atlas, but is agronomically preferable Cereal varieties are recommended in relation to their maturity group or use, and to the 3 main rainfall zones.—M.P.

1265 RIEPMA KZN, P. De reactie van granen op herbiciden in afhankelijkheid van het groeistadium. [**The reaction to herbicides of cereals at various stages of growth.**] *Gestenc. Meded. 11. Cent. Inst. Landbouwk. Onderz., Wageningen* 1953, pp. 16, bibl. 29, illus., English summary pp. 15-16.

In the period 1947-52, experiments were carried out to test the effect of DNOC, MCPA and DCPA, applied to winter rye, winter and spring wheat, spring oats and spring barley, at various stages of growth, on yields of grain and straw, 1000-grain weight, number of grains per ear and length of the last leaf. The plots were weed-free so that only the effects on crops were involved. The herbicides were applied at the following rates : DNOC, 5 kg. active material per ha. ; sodium salts of MCPA and DCPA, 1 kg. acid equivalent per ha. All herbicides were applied as 1000 l. liquid per ha. DNOC had a yield-stimulating effect on winter rye and winter wheat amounting to 250 and 400 kg. grain per ha., respectively, but this maximum stimulating effect was only attained when DNOC was applied at the beginning of the tillering stage (3·5 to 5-leaf stage). DNOC had no significant yield-stimulating effect on oats when applied at 5 kg. active material per ha. but had a significant effect when applied at 2·5 to 4 kg. per ha. at the early tillering stage. DNOC applied after the early tillering stage caused yield depressions. DNOC applied after frost or on a wet crop also caused yield depressions. DNOC applied at the tillering stage to winter cereals increased the number of grains per ear by 6·5% and the 1000-grain weight by 3·5% but had no effect on the length of the last leaf. DNOC increased the length of the last leaf in spring oats. DCPA caused serious yield depressions in all cereals, when applied at the beginning of the tillering stage, and increased the length of the last leaf ; it also caused yield depressions when applied a few days before heading. MCPA had little effect on the yields of cereals, although it damaged stands when applied at early stages of growth. MCPA and DCPA should not be applied, it is concluded, before cereals reach a height of 25-30 cm.—W.J.B.

1266 POHJAKALLIO, O. **On the effect of light conditions on the dry matter yield, dry matter content, and root-top ratio of certain cultivated plants.** *Acta agric. scand.* 1954, **4,** No. 2, 289-310, bibl. 18. [Pl. Path. Dep., Univ. Helsinki, Finland]

The experiments reported were carried out at the Viik Farm (lat. 60°10′N.) and at the Muddusniemi Farm (lat. 60°N.) in Finland. Crops used included a number of grass and clover species, winter- and spring-wheat, winter-rye, spring-barley and spring-oats. The effect of different light intensities on the dry-matter yields of the herbage species, winter-wheat and winter-rye was similar. In the case of winter-rye (Ensi), decreasing the light intensity resulted in a relatively marked decrease in the dry matter yields of roots plus shoots. In experiments where winter-wheat was exposed to different light intensities and was either given manurial treatment, or not so treated, decreasing the light intensity resulted in relatively more marked dry-matter yield decreases in the manured plants. Compared with 10 hr. photoperiods, 24 hr. photoperiods increased dry matter to a considerably lesser extent in the non-manured than in the manured winter-wheat. Decreasing the light intensity decreased the root/top ratios in the non-manured winter-wheat ; in the manured plants, the root/top ratio had a much lower value than in the non-manured plants and was virtually unaffected by variations in light intensity. Lengthening the photoperiod from 10 to 24 hr. reduced the root/top ratio more in manured than in non-manured plants. In general, the effect of lengthening the photoperiod resulted in greater yield increases in the herbage species than in the cereals. No injurious effect of continuous light on the energy economy of the plants in these experiments was noted. It appeared that the normal light intensities prevailing in Finland were not too high for the growth of the usual crop species, even where the plants were grown in continuous light, as in Lapland.—P.J.B.

1267 CUNNINGHAM, D. K. **Comparative studies of the chemical and physical properties of some cereal proteins.** *Diss. Abstr.* 1954, **14,** No. 8, 1138-9. [Univ. Minnesota]

1268 DEXTER, S. T. **The vapor-pressure or relative humidity approach to moisture-testing for safe farm-storage of harvested crops.** *Agron. J.* 1955, **47,** No. 6, 267-70, bibl. 17. [Michigan Agric. Exp. Sta., East Lansing]

The theory of the use of the relative-humidity values of air in stored farm products as an index of safe storage conditions is discussed and examples are given of conditions under which the full vapour pressure of stored farm products is instrumental in producing levels of relative humidity detrimental to safe storage. An experiment was carried out to study the rate of establishment of equilibrium between samples of grain and air enclosed in a container. The attainment of equilibrium between the relative humidity of the air and of the wheat was rapid ; in the case of similar trials with hay, equilibrium was reached only after several hours.—P.J.B.

1269† WARNER, M. G. R. and LAWTON, P. J. **The use of polythene film bags for grain samples.** *Rep. 34. NIAE* [n.d.], pp. 7.

In the investigation described, wheat seed samples, wet or dry, were placed in polythene bags, 0·0015 or 0·005 in. thick, sealed with polythene tape of the same thickness and stored in dry or wet atmospheres for 6 days, or 9 weeks. It was concluded that, if the seed samples are within the range of moisture normally encountered and the polythene bags and tape are 0·005 in. thick, the changes in moisture content of the seed are negligible for a storage period of a week and probably longer, under normal atmospheric conditions. The amount of water which penetrates through a polythene layer of a given thickness can be calculated.—E.B.O.

1270 PALMÉR, J. and BORG, A. Lagringsförsök med betat utsäde. [**Storage trials with treated seed.**] *Svensk Frötidn.* 1955, **24,** No. 1, 2-4.

In trials in Sweden, Panogen at rates of 200 ml. per 100 kg. seed was used to treat the seed of a number of spring wheat, barley and oat varieties. The seed was treated on 25 February, 29 March, or 26 April and stored until 17 September, with the object of investigating the effect of the seed treatment on the germination of cereal seed stored at different moisture contents, ranging from 14·4 to 18·6%. In no case was there any significant difference between treated and untreated seed in respect of germination and shooting capacity.—P.J.B.

1271 HUKILL, W. V. and IVES, N. C. **Radial air flow resistance of grain.** *Agric. Engng, St. Joseph, Mich.* 1955, **36,** No. 5, 332-5, bibl. 4, illus. [Iowa Agric. Exp. Sta., Ames]

1272 CORBETT, G. G. and VEITCH, A. **A survey of in-bin drying plants in Scotland 1952.** *Tech. Mem. 103. NIAE* 1954, pp. 20.

1273 PINGALE, W. V. and BALU, V. **Grain storage practices in India.** *Trop. Agric. Trin.* 1955, **32,** No. 2, 88-94, bibl. 26, illus. [Cent. Fd Technol. Res. Inst., Mysore, India]

Bulk-, receptacle-, bin- and underground-storage and the use of jute bags for storing grain in India and Pakistan, are described briefly. The merits of each practice are discussed.—W.J.B.

1274 Ross, W. M. and Miller, J. D. **A comparison of hill and conventional yield tests using oats and spring barley.** *Agron. J.* 1955, **47,** No. 6, 253-5, bibl. 4. [Fort Hays Branch, Kansas Agric. Exp. Sta.]

In trials in Kansas in 1952 and '53, oats and spring barley were sown in hills, rod-rows and 0·02 ac. drilled plots; in 1954, the drilled plots were omitted. The hills were sown with a hand maize-sower with a spacing of 1 ft. between hills in rows 1 ft. apart. Sowing rates were 24 or 25 seeds per hill, about the same amount as that recommended in practice for the area. Bushel yields per ac. were calculated by multiplying the yield in g. per hill by 2 for barley and 3 for oats. Variety × sowing-method interactions occurred once in four cases for oats and three in five cases for barley. Variability in hill tests was greater in all cases than with the other sowing methods. In comparisons involving hills, 5 out of 6 varietal yield correlations were significant for oats and only 4 out of 7 significant for barley. Barley appeared to be more liable than oats to react differently in hills than in rod-rows. The value of the hill method of yield testing is discussed. The advantages of the hill method include the small area and amount of seed needed for tests, and the fact that randomized blocks, rather than more complicated designs, can be used. The method is regarded as of value for screening large numbers of varieties, but as a supplement, only, to the present methods of testing. —P.J.B.

LEGUMES

COWPEAS

1275 Singh, H. B. and Sikka, S. M. **Cowpeas that do better.** *Indian Fmg* 1955, **4,** No. 12, 16-18, illus. [Indian Agric. Res. Inst., New Delhi]

Two outstanding new varieties of cowpea (*Vigna catjang*), Pusa Phalguni and Pusa Barsati, are described. The former yields an average of 10 maunds of green pods per ac. within 100 days of sowing (1 maund = 82·29 lb.) and the latter (an early variety) an average of 90 maunds of green pods per ac. within 75 days of sowing. Both can be used for human consumption.—W.J.B.

1276 Hare, W. W. **Seed treatment of cowpeas.** *Pl. Dis. Reptr* 1955, **39,** No. 7, 580-1, bibl. 2. [Mississippi State Coll., State College]

In field trials during 3 years in Mississippi, cowpeas (*Vigna sinensis*) were treated with 8 different fungicidal seed treatments. Only in one year, which was relatively favourable to growth, did seed treatment significantly benefit stands. There was no difference between the varieties Extra Early Blackeye, Dixilee and Brown Sugar Crowder in terms of response to seed treatment. The lack of response to treatment was ascribed largely to the fact that cowpeas are sown late in Mississippi (late May), when soil conditions are favourable to rapid germination; in this region, it was thought unnecessary to protect cowpea seed by fungicides.—P.J.B.

SOYABEANS

1277 Torrie, J. H. and Briggs, G. M. **Effects of planting date on yield and other characteristics of soybeans.** *Agron. J.* 1955, **47,** No. 5, 210-12, bibl. 8. [Wisconsin Agric. Exp. Sta., Madison]

Five soyabean varieties, Flambeau, Mandarin 507, Manchu 606, Manchu 3 and Mukden 4, representative of the range of maturity groups grown in Wisconsin, were grown during a 5-year period. Sowing dates in each year were about 10 May, 20 May, 1 June and 10 June. Plant characters studied included: seed yield, days from emergence to maturity, plant height, lodging index, seed quality index, oil and protein content of seed and iodine number of oil. Sowing dates had little effect on the seed yields of the two early varieties Flambeau and Mandarin 507; with the other varieties, seed yields declined progressively where sowing dates were later than 20 May. Similar trends were noted in the case of oil content. The protein content of the seed was not significantly affected by delayed sowing. A rise in the iodine number of the oil occurred in all varieties as sowing was delayed. Times of maturity were retarded by about 1 day with every delay of two days in sowing in all varieties; no effect on lodging incidence was noted. Seed quality was improved slightly as sowing was delayed in the case of all varieties, except Mukden 4. —P.J.B.

1278 Hartwig, E. E. **Factors affecting time of planting soybeans in the Southern States.** *Circ. 943. U.S. Dep. Agric.* 1954, pp. 13, illus. [Delta Branch Mississippi Agric. Exp. Sta., Stoneville]

The studies reported were conducted at Stoneville, Mississippi, during 1949-51 and in west Florida in 1952, and were carried out to provide basic information on the rate of emergence and growth, total growth, seed yield and seed composition of soyabeans sown over a range of sowing dates in the southern USA. Varieties used were Wabash, S-100, Ogden and Roanoke, the top-yielding varieties of Groups IV, V, VI and VII and classified as very early, early, medium and medium-late, respectively, at Stoneville. Sowing dates were at approx. 10-day intervals from 10 April-20 June. At all sowing dates, Roanoke consistently made the most rapid, and Wabash the slowest, growth, but all varieties responded similarly to sowing date in

terms of growth rate. Mean growth of all varieties at 42 days after emergence following sowing on 10 May, was about 50% more than where they were sown on 10 April. Optimum sowing dates in the trial area appeared to be when the minimum soil temperature was 65°F. and when daylength had reached 14·5 hr., which occurred on 1 May. Yields of medium and medium-late varieties (Ogden and Roanoke) were reduced less by late sowing than were the yields of very early and early varieties. The length of the period between flowering and maturity where sowing dates ranged from 10 April to 20 June decreased from 89 to 58 days for Wabash, from 102 to 74 for S-100, from 110 to 82 for Ogden and from 142 to 87 for Roanoke. The average date of maturity for the medium late variety Roanoke was delayed 5 days by delaying sowing from 10 April to 20 June ; with the early variety Wabash, a similar delay in sowing delayed maturity from 20 August to 22 September. With late varieties, there was a considerable range of time over which they could be sown without materially reducing yields ; with the very early variety Wabash, yields dropped markedly when sowing was delayed until after 20 May.—P.J.B.

1279 WEBER, C. R. **Effects of defoliation and topping simulating hail injury to soybeans.** *Agron. J.* 1955, **47,** No. 6, 262-6, bibl. 2, illus. [Iowa Agric. Exp. Sta., Ames]

Studies were made of the separate and combined effect of defoliation and topping of soyabeans at different growth stages on seed yield, seed composition and other agronomic characters. Richland soyabeans were sown in mid-May and plants at 3 growth stages were subjected to 5 degrees of top removal, combined with nil, 50 and 100% defoliation. The growth stages at which the treatments were made were : (a) first trifoliate leaf unrolled and second in process of unrolling, (b) 5-6 trifoliate leaves unrolled, with less than 1% of plants showing flowers, (c) 9-10 trifoliate leaves unrolled, at full-bloom stage. The degrees of topping used were nil, 25, 50, 75 and 100%. Where 50% defoliation was done at any of the 3 growth stages, yields showed only slight reductions. Yields were reduced by 20% following 100% defoliation at growth stage (a). With no defoliation, no topping treatment caused more than 10% reduction in seed yields ; yield decreases following topping were greatest when done at growth stages (a) and (b). Complete defoliation delayed maturity much more than did topping ; 50 and 100% defoliation delayed maturity by about 1 and 8 days, respectively. A high degree of topping resulted in slight decreases in seed-oil content ; 100% defoliation at stage (c) resulted in the greatest seed-oil-content decrease of about 1%. Topping treatments slightly increased the iodine number of the oil ; 100% defoliation at stage (c) resulted in an increase of about 2 points in the iodine number.—P.J.B.

1280 FRIBOURG, H. A. and JOHNSON, I. J. **Response of soybean strains to 2,4-D and 2,4,5-T** *Agron. J.* 1955, **47,** No. 4, 171-4, bibl. 4, illus. [Iowa Agric. Exp. Sta., Ames]

The strains used in these experiments were selected from 2000 introductions from China, Manchuria, Korea and Japan and were within the maturity range of adaptation at Ames, Iowa. In greenhouse trials, 40 strains were tested for their response to microdroplet (0·013-0·014 ml.) applications of 5% Tergitol with 50 and 100 ppm. concentrations of 2,4-D acid equivalent. In field trials, 184 introduced strains, with Hawkeye used as a standard, were treated with nil, 0·1 and 0·25 lb. 2,4,5-T a.e. in 8 gal. spray volume per ac. when most of the plants were in the full-bloom stage. The relative responses of the different strains in the field trials are given as a frequency distribution of the percentage reductions in yield. There were significant differences between strains in their resistance to 2,4,5-T in the field. The most apparent reason for these differences was the capacity for certain varieties to recover by the production of new floral primordia. Early strains were more severely damaged than late strains. Data are given comparing the response to 0·25 lb. 2,4,5-T per ac. of varieties found most susceptible and most resistant to the 0·1 lb. 2,4,5-T treatments. In most cases, strains treated with 0·25 lb. 2,4,5-T per ac. were very severely damaged. The range of yield reduction of the most resistant strains ranged from 20 to 55% of untreated controls ; several strains showed a moderate degree of resistance to the 0·25 lb. per ac. rate. Hawkeye yields were 34 and 17% of controls following treatment with 0·1 and 0·25 lb. 2,4,5-T per ac. In the greenhouse trials, leaf size response to 2,4-D applied in microdroplets differed significantly (1% level) between strains. Negative correlations were found between the yield reductions of strains treated with 0·1 lb. 2,4,5-T per ac. in the field and 50 or 100 ppm. concentrations of 2,4-D in the greenhouse.—P.J.B.

1281 FREIBERG, S. R. and CLARK, H. E. **Changes in nitrogen fractions and proteolytic enzymes of soybean plants treated with 2,4-dichlorophenoxyacetic acid.** *Pl. Physiol.* 1955, **30,** No. 1, 39-46, bibl. 17, illus. [New Jersey Agric., Exp. Sta., New Brunswick]

Soyabean plants grown in solution and treated with 2,4-D [Na salt] were analysed for several nitrogen constituents and for proteolytic enzyme activity. Control and treated plants were both grown in a minus-N solution during and following a 25-hr. exposure of the latter to 5 ppm. 2,4-D added to the nutrient solution. Essentially no change in total dry weight of treated plants occurred after ex-

posure to 2,4-D. It is suggested that the very high relative humidity prevailing at the time of the harvest was responsible for the lack of difference in percentage dry matter of leaves between treated and and control plants. Nitrate assimilation was equally rapid in treated and control plants. The N distribution in the different plant organs was greatly affected by 2,4-D treatment, although no difference was found in total N content between treated and control plants as a whole. By the third day after start of treatment, protein N on a per plant basis was lower in the leaves and much higher in the stems and roots of treated plants than in corresponding tissues of controls harvested at the same time or at the start of treatment. Apparently some of the protein in the leaves of treated plants was hydrolyzed and the products were translocated to the stems and roots where more protein was resynthesized. Marked increases in soluble organic N were found in the stems and roots of treated plants above that found in controls harvested at the start of treatment. Most responsible for this increase was the fraction containing undetermined forms of soluble organic N. Proteolytic activity in extracts of all organs of the plants was markedly affected by treatment with 2,4-D. Decreased proteinase and peptidase activity in leaves and increased proteinase and peptidase activity in stems and roots followed treatment with 2,4-D.—Authors' summary.

GROUNDNUTS

1282 BUNTING, A. H. and LEA, J. D. **The choice of groundnut varieties for production in three areas of Tanganyika.** *Emp. J. exp. Agric.* 1955, **23,** No. 89, 39-44, bibl. 8. [Res. Div., Sudan Minist. Agric.]

From variety trials carried out each season from 1947-52 at Kongwa, Urambo and in the Southern Province, certain conclusions were drawn as to the groundnut varieties which might prove suitable for these areas. At Kongwa, selections from Spanish and Natal-Barberton groups held promise for mechanized production. At Urambo, varieties such as Mwitunde, which is a long-season spreading bunch variety with some degree of disease resistance, are required. In the Southern Province, the Spanish and Natal-Barberton, short-season types were most promising, except where rosette and *Cercospora* diseases were prevalent. No suitable long-season type has yet been found for infected areas.—M.P.

1283 GILLIER, P. Étude des symptômes de carence en éléments majeurs sur arachide. [**A study of the symptoms of major element deficiency in groundnuts.**] *Oléagineux* 1955, **10,** No. 7, 479-80, bibl. 2, illus. [Inst. Rech. Huiles et Oléagineux, Bambey, Senegal]

The deficiency symptoms shown by groundnuts in pot experiments are described.—E.B.O.

1284 WARNER, M. G. R. and others. **The determination of the moisture content of groundnuts.** *Rep. 39. NIAE* 1954, pp. 10.

1285 CHAUGULE, B. A. **Studies on sulphur fertilization with Spanish Improved variety of groundnut at Dharwar.** *Poona agric. Coll. Mag.* 1954-5, **45,** No. 3-4, 118-22, bibl. 3. [Poona Agric. Coll., India]

Trials were carried out in 1951-2 to determine the effects on the yields of groundnuts of applications of sulphur which were made to the soil 3-8 weeks before sowing. In 1951, 150 lb. sulphur per ac. increased the yield of pods (compared with the control, no sulphur) from 581 to 739 lb. per ac. In 1952, 100 lb. sulphur per ac. increased the yield from 456 to 551 lb. per ac.—W.J.B.

1286 HAYWARD, L. A. W. **Losses associated with groundnuts infested with *Trogoderma granarium* Everts.** *J. Sci. Fd Agric.* 1955, **6,** No. 6, 337-40, bibl. 1, illus. [W. Afr. Stored Products Res. Unit., Kano, Nigeria]

A laboratory storage experiment is described in which the dry weight of frass produced by this pest is shown to be approximately equal to the loss of dry matter. Loss of edible nut is thus shown to be about equal to twice the frass weight.—From author's summary.

1287 DA FONSECA, J. P. C. Alguns aspectos da colheita, armazenamento e transporte do amendoim (mancarra) na Guine Portuguesa. [**Some aspects of the collection, storage and transport of groundnuts in Portuguese Guinea.**] *Garcia de Orta* 1954, **2,** No. 3, 294-310, illus., French summary pp. 308-9.

PEAS

1288 MANNER, R. Hammenhög's foderärt Valör. [**Hammenhog's Valör fodder pea.**] *Hammenhög's Seed Cat.* Spring, 1955, 9-12.

In trials at Gullåker, mean dry-matter yields of Valör plants (8290 kg. per ha.) were 1·2% higher than those of Solo and considerably higher than those of Hero, Parvus and Brio. In similar trials, the seed yields of Hero and Valör were 2977 and 2971 kg. per ha. ; Valör gave 8, 4 and 10% higher seed yields than Solo, Parvus and Brio, respectively. In official State trials during 1952-3, seed yields of Valör were higher than those of Hero, Parvus and

the culinary pea Torsdag's III and lower than Brio. Valör is considered to combine high seed yields with high green-forage yields.—P.J.B.

1289 Pesola, V. A. **Protein content of field pea seeds as a varietal character.** *Acta agr. Fenn.* 1955, **83,** 125-32, bibl. 16. [Pl. Breed. Dep., Agric. Res. Centre, Jokioinen, Finland]

The work done at the above Department has shown that the protein content of pea seeds can be increased by plant breeding.—M.H.

1290 Riepma Wzn, P. Zaaizaadbehandeling met moderne beschermingsmiddelen bij peulvruchten in 1952. [**Treatment of pea and bean seed with modern protective substances in 1952.**] *Gestenc. Versl. Interprov. Proeven 40. Cent. Inst. Landbouwk. Onderz., Wageningen* 1953, pp. 22, bibl. 2, illus.

The influence of various seed treatments (using protective substances) on the plant population, and on the yields of seeds and haulms of peas was tested. Similar trials were carried out with beans (*Phaseolus* sp.). Three seed-dressings, containing respectively, a quinone, TMTD and an organo-mercuric compound, were applied to Rondo and Servo pea seeds, each at the rate of 38 g. per kg. seed. The seeds were sown in various types of soil in the Netherlands. The highest yields of peas (about 200 kg. per ha. more than from untreated seed) were obtained by the use of TMTD and organic-mercuric dressings, but the plant population obtained after the use of TMTD was notably lower than those obtained after other dressings.—W.J.B.

1291 Apple, J. W. and Martin, R. **Pea aphid control with Demeton in relation to pea plant maturity.** *J. econ. Ent.* 1955, **48,** No. 2, 193-5, bibl. 7. [Wis. Univ., Madison]

Demeton applied at the rate of 1 oz. per acre controlled the pea aphid (*Macrosiphum pisi*) satisfactorily on peas for canning when the interval before harvest was no greater than 8 days. Control on pea plants in earlier stages of development required heavier applications, up to 8 oz. per acre, or repeated treatment. Residue analyses showed that only one-half of the original toxicant was present in the plants after 5-7 days from treatment. Harvested peas, which had been canned and frozen, contained residues amounting to less than 0·3 ppm.—E.B.O.

1292 Sharp, W. O. and Blunt, C. F. **Control of marsh spot in peas.** *Fmr and Stk-Breed.* 1955, **69,** No. 3421, 52-5, illus.

On alkaline marsh soils in south-east England, where the pea crop shows signs of yellowing, accompanied by leaf symptoms of manganese deficiency in the early stage of growth before flowering, spraying immediately with 5 lb. manganese sulphate is recommended. Where 2 or more sprayings are made, 5 lb. of manganese sulphate is advised for each. Spraying can be at high- or low-volume ; the addition of a wetting agent is necessary.—C.L.S.

BEANS

1293 Cyprus Department of Agriculture. **Quarterly Review No. 38.** 1954, pp. 44.

Trials with varieties of *Vicia sativa* and *Lathyrus* spp. p. 21. Sixteen local and introduced varieties were compared. *V. sativa* 1-52-175, from Israel, gave the highest yield of grain, followed by the local *V. sativa* varieties C-51-91 and C-52-10, the local *L. ochrus* C-51-88 and *L. sativus* 1-51-105 from Syria.—W.J.B.

1294 Riepma Kzn, P. Onkruidbestrijding in veld- en stambonen en in lupine. [**Weed control in field beans, runner beans and lupins.**] *Tech. Ber. 66. Peulvruchl. Stud. Comb., Wageningen* 1955, 1-4.

The effect of pre- and post-emergence applications of herbicides on the seed yield of field beans (*Vicia faba*), which were kept weed-free, was determined. The following treatments were applied : (1) 7·5 l. per ha. DNBP (13% active material) before emergence, and when the plants were 5 and 10 cm. high ; (2) DNOC (80% active material) applied before emergence at 2·5 and 4 kg. per ha. ; (3) IPC, 5 kg. active material per ha. applied before emergence and when the plants were 5 cm. high ; (4) IPC, 7·5 kg. active material per ha. applied as in (3) ; (5) calcium cyanamide at 250 kg. per ha. applied before emergence and when the plants were 5 cm. high. There was also an untreated control (6). None of the treatments caused any significant reduction in the yield of beans compared with the control.—W.J.B.

1295† Scott, B. I. H. and others. **Correlation between the electric current generated by a bean root growing in water and the rate of elongation of the root.** *Aust. J. biol. Sci.* 1955, **8,** No. 1, 36-46, bibl. 7, illus. [Dep. Physics, Univ. Tasmania]

OTHER

1296 Sardar Khan. **C. 612—A new variety of grain (*Cicer arietinum*) for the Punjab (Pakistan).** *Agric. Pakist.* 1954, **6,** No. 2, 157-62. [Punjab Agric. Coll., Lyallpur]

A new blight-resistant, high-yielding variety of chick pea (*Cicer arietinum*), C.612, is announced. It

has outyielded Punjab 7 in numerous trials. C.612 outyielded other varieties in the blight-affected areas and in the canal-irrigated area of the Punjab. In the wilt-affected area (Mianwali and part of Shahpur) the variety C.12/34 outyielded C.612. The appearance of C.612 and the appearance and quality of its grain are described.—W.J.B.

1297† WANANKAR, S. M. **Madhya Bharat's new pulse strains yield more.** *Indian Fmg* 1955, 4, No. 12, 11-12 and 32, illus. [Dep. Agric., Madhya Bharat, India]

Brief notes are given on new strains of green gram (*Phaseolus aureus*), black gram (*Ph. mungo*), pigeon pea (*Cajanus cajan*), and Bengal gram (*Cicer arietinum*) suitable for sowing in various parts of Madhya Bharat State.—W.J.B.

GENERAL

1298 MASEFIELD, G. B. **Conditions affecting the nodulation of leguminous crops in the field.** *Emp. J. exp. Agric.* 1955, **23,** No. 89, 17-24, bibl. 10. [Dep. Agric., Univ. Oxford]

Field experiments in England provided no evidence that nodulation of field beans (*Vicia faba*), dwarf beans (*Phaseolus vulgaris*), or peas is inhibited by the proximity of another plant of the same species or a different species (maize, oats, barley, foxtail millet). The use of DDT and Dieldrin achieved only partial control of the larvae of *Sitona lineata*, which damage the nodules of field beans and peas, and seed yield was not significantly increased. Positive correlations between nodule weight and plant weight were found in crops of *Dolichos lablab* and *Phaseolus trilobus* in the Sudan, but less frequently between crops in different regions or under different treatment.—From author's summary.

1299† ALLOS, H. F. and BARTHOLOMEW, W. V. **Effect of available nitrogen on symbiotic fixation.** *Proc. Amer. Soc. Soil Sci.* 1955, **19,** No. 2, 182-4, bibl. 10. [Iowa Agric. Exp. Sta., Ames]

In solution-culture experiments using 7 leguminous and 4 non-leguminous plants, determinations were made of the magnitude of utilization of free and fixed N by well-nodulated leguminous plants, when different amounts of fixed N were present. N was added to the cultures at weekly intervals, from one week after sowing for a period of 10 weeks, rates of nil, 12, 24 and 48 mg. per 0·5 gal. pot. N as ammonium sulphate, containing N^{15} as a tracer, was used. Total amounts of N added over the experimental period were 108, 216 and 432 mg. per pot. Growth responses to N were observed in all cases, except soyabeans. The magnitude of N fixation was proportional to the total plant growth and N uptake. N fixation decreased and manurial N uptake increased as the amount of supplied N increased. The dry-matter yield of the legumes during the 10-week period averaged 9·1 mg. ash-free dry matter per pot for soyabeans, 15·4 mg. for groundnuts, 8·8 mg. for Buffalo lucerne, 8·2 mg. for Ranger lucerne, 8·3 mg. for lespedeza (*Lespedeza stipulacea*), 5·7 mg. for Ladino clover (*Trifolium repens* var). and 6·4 mg. for birdsfoot trefoil (*Lotus corniculatus*), where the highest level of N was supplied; where no N was supplied, respective yields averaged 9·7, 13·8, 3·6, 4·6, 5·8, 1·5 and 1·2 mg. per pot. Amounts of N fixed by the above crops where no N was supplied averaged 310, 333, 108, 140, 128, 44 and 34 mg. per pot and where the highest level of N was applied, 135, 240, 57, 65, 51, 27 and 23 mg. per pot, respectively. The lowest rates of N application tended to increase plant growth and N uptake rather than to decrease N fixation. The highest rate of N treatment had a more drastic effect on N fixation and a lesser effect in increasing plant yields than did low rates of N treatment.—P.J.B.

1300 SÁNCHEZ, O. Efectos de tres insecticides sobre los procesos de amonificación y nitrificación en el suelo y sobre la nodulación de dos leguminosas. [**Effect of insecticides on the processes of ammonification and nitrification in the soil and on nodulation in legumes.**] *Acta agron., Palmira* 1954, **4,** No. 4, 219-38, bibl. 13, illus., English summary pp. 236-7.

6·5% BHC at rates equivalent to 10 and 20 kg. per ha., 10% Chlordane at rates equivalent to 8 and 15 kg. per ha. and 10% Toxaphene at rates of 10 and 20 kg. per ha. were applied to sand in pots in which *Crotalaria juncea* and *Phaseolus vulgaris* were grown. There were controls which were not treated with the insecticides. BHC, at rates of 10 and 20 kg. per ha. (5 and 10 times the recommended rate, respectively), reduced the number of root-nodules per plant in both legumes to less than half the number recorded on control plants. Toxaphene, at 10 and 20 kg. per ha., (5 and 15 times the recommended rate), markedly reduced the number of nodules per plant in both legumes. Chlordane, at rates of 8 and 15 kg. per ha. (4 and 7·5 times the recommended rate), reduced the number of nodules per plant only very slightly in the case of both legumes.—W.J.B.

ROOTS

SUGAR-BEET

1301 SIMON, M. L'importance de la densité de plantation pour le rendement de la betterave sucrière. [**The importance of density of planting for sugar-beet yield.**] *Potasse* 1955

29, No. 224, 63-8, illus. [Inst. Belge pour l'Amélioration de la Betterave, Tirlemont]

Records from the above Institute over the past 20 years are quoted to show that 75,000 sugar-beets per ha. at harvesting is the optimum density, not only to obtain the highest yields but also to reduce injury due to virus yellows and to provide soil cover. To obtain this optimum density, plants should be thinned to 33 per 10 m. row.—D.B.

1302 WOFFORD, I. M. and DEXTER, S. T. **The effect of cultural practices on emergence and uniformity of stand of sugar beets.** *Agron. J.* 1955, **47,** No. 2, 57-60, bibl. 15. [Michigan Agric. Exp. Sta., East Lansing]

A series of trials in Michigan was established to determine the response of sugar-beet seedling emergence to different methods of seed-bed preparation and different green-manure crops. Segmented seed was used and sown at 8 lb. per ac. In trials during 1951-2, using different green-manure treatments, sugar-beet seedling emergence was significantly higher where barley was used than where rye or field peas were used. Emergence was also significantly higher where a wheat-straw mulch or ryegrass was used than where rye was used. The number of marketable roots was significantly higher following ryegrass or barley turned in than after wheat-straw mulch or rye turned in. The use of ryegrass resulted in the highest weight of marketable roots, (55 lb. per 104 ft. of row), followed by barley, 51 lb., oats, 50, and oats + peas, 49 lb. Thus, it appeared that either too much, or too little green plant material from spring growth resulted in poor sugar-beet emergence. No one tillage treatment was significantly better than another, but ploughing-under the green manure gave slightly better results than discing-in the residues. In a second experiment, the effect on sugar-beet emergence of different methods of handling a previous crop of lucerne, combined with different methods of seed-bed preparation was studied. Emergence of sugar-beet was as high on plots where all the lucerne was removed, as on plots where all or part of the hay was left during the previous season. Emergence of seedlings appeared to be related to tillage treatments. Based on visual readings, plots ploughed in autumn appeared to have the most vigorous seedlings. In a third trial, different seed-bed cultivation treatments were compared ; treatments used were designed to produce : (a) a loose-wet seedbed, (b) a firm-wet seedbed, (c) a firm-dry seedbed and (d) a loose-dry seedbed. Treatment (a) gave the best results in terms of rapid emergence and vigour of crop throughout the entire season. Treatments (a) and (b) resulted in the most uniform stands and highest seedling emergence.—P.J.B.

1303 STRANZ, D. Das Zuckerrübenwachstum in Skåne in Abhängigkeit von meteorologischen Faktoren. [**The growth of sugar-beet in Skania and its dependence on meteorological factors.**] *Socker* 1955, **11,** No. 1, 1-30, bibl. 12, illus.

In Skania (southern Sweden) the earlier phase of growth, from sowing to end of July, was influenced by weather to a greater extent than was the later phase from end of July to harvest early in October. Irrigation was considered to be unnecessary. Sowing 2-3 weeks earlier than normal (27 April) in a soil which, by suitable precautions [e.g. choice of soil type], has a temperature of about 7°C. should provide favourable conditions similar to those in Netherlands and central Germany and give a 20-25% increase in yield.—D.B.

1304† GÖTZ, W. Die Zuckerrübe als Zwischenfrucht. [**Sugar-beet as a catch crop.**] *Dtsch. landw. Pr.* 1954, **77,** No. 11, 153-4.

Very profitable use of the available acreage of a small farm can be made by growing sugar-beet as a summer catch crop for use as fodder. For this purpose the fodder-sugar-beet Strubes GK is suitable. An example is given of yields obtained by sowing sugar-beet at the beginning of July, after winter-barley or Landsberger mixture, at a sowing rate of 15-18 kg./ha., the seed being drilled in rows 30 cm. apart. When grown as a catch crop, heavy manuring, especially with N fertilizer, is essential for high yields. When manured at the rate of 160 kg. N per ha., a yield of 680 dz. roots and tops per ha. was obtained within a 4-month period.This yield, equivalent to 8500 kg. dry matter per ha. for 4 months' use of land, is greater than that obtained from any other crop, even green maize.—D.B.

1305 BERNSTEIN, L. and others. **The interaction of salinity and planting practice on the germination of irrigated row crops.** *Proc. Soil Sci. Soc. Amer.* 1955, **19,** No. 2, 240-3, bibl. 6. [U.S. Salinity Lab., Riverside, Calif.]

Failure to obtain satisfactory stands of furrow-irrigated crops on saline soils is common in California, owing to salt concentration in the raised beds following irrigation. In the trials reported, a series of plots with different levels of salinity and planting beds of different shapes was prepared. The standard sugar-beet bed (flat-topped, single-row bed) was consistently the worst in terms of the emergence of a number of crops. The emergence of sugar-beet was almost completely inhibited where the initial salinity was of the order of 4 millimhos. Results during 2 years from 2 locations where 6 crops were used indicated that initial soil salinity values a few millimhos above those of well-leached soil could result in complete loss of sugar-beet stands where each furrow was irrigated. Alternate-furrow irrigation at sowing time resulted in some

improvement. Standard sugar-beet beds were modified in shape to give sloping beds, back to back, which were then irrigated in alternate furrows. The seeds were sown about two-thirds of the way up the sloping bed. Satisfactory stands of all crops were obtained on such beds, even where initial soil salinity values were as high as 43 millimhos. Results with flat-topped, 42 in. lettuce beds, with tops 20 in. across, were intermediate between those where the standard sugar-beet and sloping beds were used. In the sloping beds, salinity tended to become concentrated in the top edges of the beds and was thus removed from the seed rows. The salinity status of the plough-layer before bedding-up could be used to predict the probable success of different sowing practices.—P.J.B.

1306 THOMPSON, E. G. **Commercial strains of sugar beet. Summary of trials 1952-4.** *Brit. Sug. Beet Rev.* 1955, **23,** No. 4, 159-61. [N.I.A.B., Cambridge]

The average results of 18 trials with sugar-beet varieties conducted in Gt Britain in 1954 are compared with those of the two previous years. Owing to the bad weather of 1954, yields per ac. of roots and sugar were lower, and increased bolting occurred. Klein E (Sharpe's) and Klein E (German) again yielded most sugar per ac. Data are also given of the yield of washed roots and tops and the percentage of sugar in the roots. Bush E continues to have the lowest percentage of bolters, with an average of 1·7% for the 3 years.—M.P.

1307 WAUTHY, R. and ROUSSEL, N. Les résultats des essais de variétés de betterave sucrière en Belgique de 1950 à 1954. [**Results of trials of sugar-beet varieties in Belgium from 1950 to 1954.**] *Publ. tech. Inst. belge Amélior. Better.* 1954, **22,** No. 4, 215-29. [Inst. Betterave, Tirlemont, Belgium]

A record is given of the performance of commercial varieties of sugar-beet as regards yield of roots and tops, sugar content and sugar yield.—D.B.

1308 MARGARA, J. and TOUVIN, H. Analyse du comportement en champs d'essais de quelques variétés de betterave sucrière cultivées en France. [**An analysis of the behaviour in experimental plots of some sugar-beet varieties cultivated in France.**] *Ann. Inst. nat. Rech. agron., Paris. Sér. B. Ann. Amélior. Pl.* 1954, **4,** No. 4, 529-37, bibl. 2. [Sta. Cent. Génét. Amélior. Pl.] [Received June, 1955]

3-year experiments were conducted in the 6 principal sugar-beet cultivation areas in France to study the commercial value of 10 varieties and the influence of soil and climate on them. A statistical examination of all the results led to the following conclusions. (1) There are significant differences between varieties in yield and sugar content. (2) The order of varieties when classified according to yield of roots by weight is approximately the inverse of that when classified by % sugar content; thus, while Kleinwanzleben N and Tourneur GRN head the list for weight of roots they are at the bottom of the list for percentage sugar content. Legland R and Vilmorin B behave in the opposite manner. (3) Yields vary considerably from plot to plot and from year to year. (4) It was not possible to judge the best environmental conditions for these varieties. Choice of a variety according to the soil and climate in which it is to be cultivated appears to be less important than in the case of cereals.—D.B.

1309 SOMMER, E. Ein Beitrag zur kurzfristigen Unterscheidung des Saatgutes von Zuckerrüben und Zuckerfutterrüben. [**A rapid means of distinguishing between seed of sugar-beet and fodder-sugar-beet.**] *Saatgutwirtschaft* 1955, **7,** 5, 139-42, bibl. 4, illus. [Inst. Pflanzenzüchtung, Kleinwanzleben]

Unlike existing methods which require germination of the seed, the method suggested here can be carried out on the dormant seed taken straight from the glomerule. The method is based on the different reaction of the seed of sugar-beet (represented by var. Kleinwanzleben E) and of fodder-sugar-beet (represented by var. Ovana) to the activity of enzymes, namely the hydrolysis of starch by amylase. For removal of the violet coloration produced by iodine solution, the amylase concentration has to be 50% stronger for Kleinwanzleben than for Ovana. Further experiments are required to show whether the method can be adopted for general use. The application of the catalase method is limited owing to the influence of external factors.—D.B.

1310 LIVINGSTON, C. and others. **Effects of maleic hydrazide and 2,4-dichlorophenoxyacetic acid on the free amino acids in sugar beets.** *Bot. Gaz.* 1954, **116,** No. 2, 148-56, bibl. 11, illus. [Colorado Agric. Exp. Sta., Fort Collins] [Received July, 1955]

As a contribution towards the elucidation of the mode of action of growth regulators in plants, a study was made of the qualitative and relatively quantitative changes in the free amino acids of sugar-beet following treatment by foliar spray with maleic hydrazide and 2,4-D (Na salt) alone and in combination. Rates, time of application, state of physiological maturity, and time of harvest after treatment are important factors affecting the free amino acids of sugar-beet. For example, maleic hydrazide (at 6 lb. per acre) and 2,4-D Na (at 2 oz. per acre) resulted in a relative decrease in glutamine, alanine, lysine and tyrosine in roots 5 days after treatment but in relative increases 60

days after treatment. The combination of 2,4-D Na and maleic hydrazide at 5 days after application tended to cancel the particular effect of either but after 60 days produced additive effects.—D.B.

1311 BAWDEN, F. C. **Sugar-beet virus diseases.** *Rep. Rothamst. exp. Sta. 1954* Harpenden, 1955, 87-91.

In wild and cultivated beet varieties tested with sugar-beet yellows virus, the severity of infection was correlated with loss of yield and with the antigen content of the plants. In all varieties the antigen was highest 3 weeks after infection, and then fell more rapidly in tolerant than in intolerant varieties. The size of the roots did not always reflect the severity of the leaf symptoms. Spraying with Systox, at 400 g. per ac. in mid-June or early July, halved the amount of virus infection in sugar-beet, and increased the yields of sugar per ac. In trials at several localities, fertilizers and spacing had no effect on yellows incidence, but early sowing increased it and spraying decreased it. Soaking seed in an insecticide gave no protection against aphids to the emerging shoots.—M.P.

1312 BLÜMKE,--Stecklingsrüben unter Deckfrucht. Ein Weg zur Verhinderung der Gelbvirus-Infektion. [**Beet stecklings under a nurse crop. A means of preventing virus-yellows infection.**] *Dtsch. landw. Pr.* 1954, **77,** No. 11, 154-5, illus.

A case is reported of the accidental protection of sugar-beet stecklings from virus yellows by sowing the beet under maize. A neighbouring stand, unprotected by a nurse crop, was attacked. On harvesting the maize, the protected stand of beet was found to be retarded in development but by autumn it was fully mature.—D.B.

1313 BJÖRLING, K. **Yellowing in beets caused by magnesium deficiency.** *Socker* 1954, **8,** No. 12, 147-56, bibl. 9, illus. [Roy. Agric. Coll., Uppsala, Sweden]

1314 CURTH, P. Temperatur und Licht als blühinduzierende Faktoren bei der Zuckerrübe. [**Temperature and light as factors inducing flowering in sugar-beet.**] *Züchter* 1955, **25,** No. 6, 176-81, bibl. 14, illus. [Dtsch. Akad. Landwirtschaftswissenschaft, Berlin]

1315 LÜDECKE, H. and PAULSEN, I. Über die Funktion des Magnesiums und seine Aufnahme im Verhältnis zu Calcium, Phosphorsäure und Kalium bei der Zuckerrübe. [**The function of magnesium and its uptake in relation to calcium, phosphoric acid and potassium in sugar-beet.**] *Z. PflErnähr. Düng.* 1955, **68,** No. 3, 240-55, bibl. 18, illus. [Inst. Zuckerrübenforschung, Göttingen]

The Mg content of tops and roots was determined at different phases of growth. The quantity of Mg present was that of a micro- rather than a macro-nutrient element. The quantity of all four nutrients absorbed from the soil during growth increased until the beginning of August and was then constant. The relative quantities of P, Ca and K absorbed with Mg are discussed.—D.B.

1316 VAJNA-PAPP, M. and VAJNA, S. Die Atmung der gerodeten Zuckerrübenwurzel während der Lagerung. **Sugar-beet respiration during storage.** *Acta agron. hung.* 1955, **5,** No. 1/2, 1-29, bibl. 13, illus., English summary p. 29.

An apparatus has been designed which allows sugar-beet root respiration to take place without superpressure, provided that volumetric measurement is sufficiently precise. It has been proved that the rate of respiration is in direct ratio to the extent of surface exposed to the air, and is independent of the weight of the beet. It has been established that the rate of respiration calculated for identical surfaces decreases from the rose end to the heel end. For this the explanation is offered that a decrease in the amount of respiratory enzymes and in the intensity of their activity takes place in the same direction. On measuring the rate of beet respiration at temperatures between 0 and 25°C. it has been found that up to 10°C. it increased exponentially with temperature in conformity with the correlation established in earlier large-scale storage experiments, and then much slower from 10° to 25°C. The loss of sugar calculated from the value of the respiratory rate agreed well with that ascertained by large-scale weighing. Apparently, therefore, the cause of loss of sugar by storage must be connected with respiration. The respiratory quotient increases with drying and at 10% loss of water its value attains 4. The increase in the value of the quotient is limited to the outer layers of the beet, but remains 1 in the inner layers in spite of the considerable loss of water arising in them as well. These experimental results point to the empirical fact that, in order to prevent quick loss of water, the beet must be covered as soon after the harvest as possible. Further, they stress the necessity for placing the nets, generally used for determining the loss of sugar during storage, on the upper surface as well, where the beet suffers the greatest loss in sugar content.—From authors' summary.

1317 FARMER AND STOCK-BREEDER. **Advance in mechanical thinning [of sugar-beet]. Four-row machine can handle full range of row widths.** *Fmr and Stk-Breed.* 1955, **69,** No. 3421, 47, illus.

1318 England and Wales Ministry of Agriculture and Fisheries. **Sugar beet harvesting machinery.** *Fm Mach. Leafl. 17. England and Wales Minist. Agric. Fish.* 1955, pp. 6.

FODDER-BEET

1319 Jonge, C. de and Lint, M. M. de. Resultaten van het productieniveau-onderzoek. III. Rooitijd en opbrengst bij voederbieten en aardappelen. [**Results of production-level investigations. 3. Effect of time of harvesting on yields of fodder-beet and potatoes.**] *Gestenc. Meded. 14. Cent. Inst. Landbouwk. Onderz., Wageningen* 1953, pp. 21, bibl. 10, illus.

Results are given for several varieties of fodder-beet and potato grown in the Netherlands.—W.J.B.

SWEDES

1320 Smith, A. M. and Anderson, G. **The relationship between the boron contents of soils and swede roots.** *J. Sci. Fd Agric.* 1955, **6,** No. 3, 157-62, bibl. 11. [Edinb. and E. Scot. Coll. Agric., Edinburgh]

If the 'available' boron fell below 0·7-1·0 ppm. of air-dried soil, raan (brown heart) was liable to occur in swedes grown in the area of the experiments. Dressings of up to 30 lb. of borax per ac. increased the available boron substantially. The boron content of the swedes was raised and the incidence of raan lowered, and no toxic effects of the borax treatment were noted. There was no effect on yield of roots but the dry-matter content was raised. An application of limestone to a heavy soil did not appear to fix any of the applied boron. —From authors' summary.

POTATOES

1321 Ramanujam, S. **The potato in Indian agriculture.** *J. Soil. Wat. Conserv., India* 1954, **3,** No. 1, 4-14. [Cent. Potato Res. Inst. Patna, India]

The desirability of extending and improving potato cultivation in India is discussed with reference to the food-value of the potato and to the results of experimental work ; indications are given of the ways in which potato cultivation in India may be improved. The main obstacles to increased potato production in future are stated to be ; (1) the absence of suitable varieties for the varying conditions of soil and climate in the country ; (2) the heavy incidence of disease and pest attacks ; (3) the scarcity of healthy seed-potatoes. With reference to (2) and (3) it is suggested that seed certification should be introduced. The following improved varieties are recommended (a) for main-season planting in the plains of north India : O.N. 45, O.N. 1202, O.N. 1337, O.N. 1360 and O.N. 2287, which yield 10-20% more than local varieties ; (b) for early planting (September) in the plains of north India : O.N. 2186, O.N. 2236 and O.N. 2253, which mature in 60-80 days and yield about 100 maunds (1 maund = 82·29 lb.) per ac. compared with 40-60 maunds yielded by the commercial variety Satha ; (c) for the hills of north India : Hybrid 8, 9 and 12, O.N. 978 and O.N. 1362 ; (d) for the hills of south India : O.N. 2090, which has consistently outyielded Great Scot. Agronomic investigations (chiefly at the Central Potato Research Institute, Patna) are summarized as follows. Irrigation is necessary during tuberization to obtain the maximum effect from nitrogenous fertilizers. On certain soils which are named, there was a marked response to phosphates. There was in general no response to potash. Early lifting of potatoes before the onset of excessively high temperatures reduces storage losses. It is suggested that the use of thiourea should be considered for breaking dormancy in the case of potatoes harvested in September-October in the hills for planting in October-November in the plains. The control of the outstanding pests and diseases is discussed and the possibility of growing potato crops commercially from true seed is briefly discussed.—W.J.B.

1322 Saksa, P. J. Maamme perunalajikkeiden viljelylaajuus ja viljelyalueet. **The extent and regions of cultivation of potato varieties in Finland.** *Maataloust. Aikakausk.* 1955, **27,** No. 1, 41-52, bibl. 3, illus., English summary p. 52.

1323 Davies, G. J. **Potato spacing experiments.** *Rep. 38. NIAE* 1954, pp. 28, illus., bibl. 7. [N.I.A.E., Silsoe, Bedfordshire]

A potato planter can work inaccurately by planting regularly at the wrong mean spacing or by planting irregularly yet achieving a correct mean spacing. These experiments were therefore undertaken, primarily, to find out what effect irregularity of planting had on the yield of the principal grades of potatoes, and also the effect, if any, on the proportions of large tubers in these grades. Mean spacings of 6, 14, 22 or 30″ were used and irregularity for each mean spacing varied from 0 to 100% irregularity (two tubers set together at twice the mean spacing). Irregularity was found to have a much smaller effect than mean spacing and its effect was only marked and consistent on the yield of tubers $<3\frac{3}{4}$″ at 22″ and 30″ mean spacings. With regard to mean spacing alone, this exerted, each year, a marked effect on the yield in the prin-

cipal grades. As the mean spacing increased, the yield of tubers <2¼" (1950, '51) and <2¾" (1952) decreased. The effect of this on total yield was offset by the increased yield of larger tubers as the mean spacing increased. For seed grades there was consistent evidence for an interaction of mean spacing and variety.—C.L.S.

1324 MONTALVO, R. Ritmo y epoca de cosecha de la papa en la sierra. [**Plant development and harvesting date of potatoes in mountainous regions.**] *Bol. trim. Exp. agropec.* 1954, **3,** No. 4, 13-17, illus. [Esta. Exp. Agric., La Molina, Peru]

Potatoes of the varieties Maco and Casa Blanca planted in February were harvested at intervals 140-220 days after planting. The yields of tubers increased at successive harvests up to about 180 days after planting; after that date there was a tendency for yields to decrease.—W.J.B.

1325 RUSSCHEN, J. Doodspuiten van pootaardappelen. Ervaringen met spuitmiddelen in 1954. [**Destruction of the foliage in potato crops grown for seed. Experience with sprays in 1954.**] *LandbVoorl.* 1955, **12,** No. 3, 120-4.

The relative merits of sprays (including an arsenite and DNOC) for destroying potato foliage are discussed.—W.J.B.

1326 CRUCQ, J. and LINT, M. M. de. Het loofklappen en doodspuiten van pootaardappelen. [**Destruction of potato foliage by chemical and mechanical means.**] *LandbVoorl.* 1955, **12,** No. 7, 326-36, bibl. 8, illus.

Types of machine suitable for the mechanical removal of potato foliage are recommended as a result of tests. Of the chemicals tried, arsenite gave the most effective kill of foliage, with the least re-growth. Mechanical removal of the greater part of the foliage combined with chemical destruction of the remainder, compared with hand-removal of the foliage, gave a lower incidence of blight but a greater incidence of *Rhizoctonia* in the tubers.—W.J.B.

1327 HÖHENER, H. Zum Totspritzen der Kartoffelstauden für die Speisekartoffelproduktion. [**Killing potato tops (by spraying) in the production of ware potatoes.**] *Schweiz. landw. Mh.* 1955, **33,** No. 7, 276-9, bibl. 5, illus. [Sandoz AG., Basel, Switzerland]

The present-day practice of killing potato tops with a DNC product in order to produce class A seed potatoes is now recommended for ware potatoes also. A DNC product, EK 54, applied in mid-July 6 weeks before harvesting, in powder form, at a concentration of 1·5% atarate of 1500 l./ha., reduced both the number and weight of diseased potatoes by 75%. DNC also acts as an insecticide, killing any stages of the Colorado beetle [*Leptinotarsa decemlineata*] which may be present. Its action as a herbicide facilitates harvesting.—D.B.

1328 WESTOVER, K. C. **The effect of periodical potato top removal on yields.** *Amer. Potato J.* 1955, **32,** No. 4, 126-31, bibl. 4. [W. Va Agric. Exp. Sta., Morgantown]

In the 5 years' trials described, certified Cobbler potatoes, early, were used in 4 of the trials and certified Rural and Sebago, both late, in 5 trials. The plantings in each trial comprised 4 or 5 replicates, each of nine 3-row plots. Starting at the early-blossom stage, the plants of the middle row of a single plot in each replicate were defoliated, or topped, at intervals of 7-11 days, until 8 sets of plots were treated, the remaining replicate serving as control. The tubers were left in the ground for 10-14 days after defoliation, or until harvest in the autumn. The following were the general results: (a) the increases in yield of No. 1 potatoes during one interval, over the yield in the previous interval, were greatest during blossom time and in the following early summer; (b) the interval yield increases of Cobbler were greater than with the late varieties, but for a shorter period; (c) no significant increases in yields occurred after 95 days from planting in the case of Cobbler and after 120 days in the case of the late varieties; (d) in most instances 90%, or more, of the crops was made in a shorter period.—E.B.O.

1329 SIVORI, E. M. and others. Influencia de los tuberculos hijos. [**Influence of newly-formed tubers on the dying-off of the potato plant.**] *Rev. Fac. Agron., Eva Peron* 1954, **30,** No. 2a, 163-6, bibl. 2.

1330 BRADLEY, G. A. **Studies on the irrigation of potatoes, onions and snap beans. 1. The effects of the irrigation of several vegetable crops at different levels of available soil moisture. 2. A study of the relationship between soil moisture and nitrogen levels, plant development and tuber set of the potato (*Solanum tuberosum*).** *Diss. Abstr.* 1955, **15,** No. 6, 925-6. [Cornell Univ., Ithaca, N.Y.]

In trials during 3 seasons, potatoes were grown in the field and irrigated when different levels of soil-moisture content, ranging from 50%, or less, were reached. Increased yields as a result of holding the available soil-moisture content above 50% resulted from the increase in size and numbers of marketable tubers. In further studies, potatoes were grown under 5 different levels of available soil moisture and 3 levels of applied nitrogen. The major effect of soil moisture on tuber set was to increase its earliness; high soil-moisture contents resulted in early tuber set, high tuber-weights and

increased top-weights. High rates of applied N tended to increase top-weights, but did not significantly affect tuber-numbers. The effect of N on tuber-weight appeared to be closely related to top-weights. It was concluded that these results showed the desirability of irrigating potatoes before available soil-moisture contents in light soils fell below 50%.—P.J.B.

1331† Sahl, E. Stoppelsaaten zur Gründüngung im Kartoffelbau. [**Sowing in stubble for green manuring of potatoes.**] *Kartoffelbau* 1955, **6,** No. 7, 154-7, illus.

Stubble-sown catch crops are particularly advantageous before a potato crop. Leguminous catch crops and sunflower should be sown in July, oil-bearing crops in early August. A list is given of stubble catch crops suitable for preceding the potato crop together with their sowing rates, spacing and rates of manuring.—D.B.

1332 Statens Forsøgsvirksomhed i Plantekultur. Forsøg med kartoffelsorter 1951-53. Foreløbig meddelelse. [**Trials with potato varieties 1951-53. Preliminary report.**] *Medd. 514. Stat. Forsøgsvirk. Plantekult.* [Contained in] *Tidsskr. Planteavl* 1955, **58,** No. 3, 545-8.

The trials reported were started in 1949 at 4 locations in Denmark. After preliminary screening trials, a number of varieties was selected for further test in 1951-3. Among medium-early varieties, highest average total tuber yields were given by Craigs Defiance, with 392 hkg. per ha., followed by Arran Banner 381 hkg., Record 362 hkg., Matador 361 hkg. and Bintje 332 hkg. per ha. Katahdin, tested during 1952-3, only, yielded 304 hkg. tubers per ha. Yields of medium-sized tubers (30-50 mm. diameter) were highest for Craigs Defiance and Bintje. Tuber quality was highest for Bintje, followed by Record ; varieties other than Bintje were not regarded as of good enough quality for the Danish culinary potato market. Bintje and Katahdin were susceptible to wart disease. In trials with late varieties for fodder and industrial use in 1951-3, dry matter yields were highest for Dianella, with 90·2 hkg. per ha., followed by Alpha, Tylstrup 38125 and Gloria, with 84·6, 80·3 and 79·9 hkg. per ha., respectively. Tylstrup 38089, tested in 1951-2, yielded 84·5 hkg. dry matter per ha., and Urtica, tested in 1952-3, 86·4 hkg. per ha. Tylstrup 38089 was susceptible to wart disease. Dianella was regarded as the best variety in terms of dry-matter yield, earliness and resistance to blight.—P.J.B.

1333 Stevenson, F. J. and others. **Early Gem : a new early, russet-skin, scab-resistant variety of potato adapted to the early potato-producing sections of Idaho and to certain sections of North Dakota.** *Amer. Potato J.* 1955, **32,** No. 3, 79-85, bibl. 2. [Pl. Industr. Sta., Beltsville, Md]

[See *Fld Crop Abstr.* 7 : 921 and 922.]

1334 Akeley, R. V. and others. **Merrimack : a new variety of potato resistant to late blight and ring rot and adapted to New Hampshire.** *Amer. Potato J.* 1955, **32,** No. 3, 93-9. [Agric. Exp. Sta., Univ. New Hampshire, Durham]

A description and the characteristics of Merrimack (Saranac × X96-56) are given.—E.B.O.

1335 Macleod, H. S. **Certified Seed Potato Control Areas in British Columbia, Canada.** *Amer. Potato J.* 1955, **32,** No. 3, 112-15. [Sci. Serv., Dep. Agric., Ottawa]

The rules and regulations governing these areas are given.—E.B.O.

1336 Kiessling, L. Erfolgreiche Unkrautbekämpfung durch Kalkstickstoff. [**Successful weed control with calcium cyanamide.**] *Kartoffelbau* 1955, **6,** No. 5, 98-9, [Süddeutsche Kalstickstoff-Werke, A.G. München, W. Germany]

In a 7-year experiment with late and medium-late potato varieties, involving 90 trials, each replicated 4 times, the question of when to apply calcium cyanamide was investigated from the standpoint of yields and weed control. It was spread, at the rate of 60-80 kg. N/ha. (a) 8-14 days before planting and (b) after planting but shortly before emergence. There was no significant difference in yields whether the manure was applied before or after planting. Weed control, however, was more successful when calcium cyanamide was applied after planting, especially if the land was lightly harrowed just before the application. Light rain was an even better preliminary.—D.B.

1337 Grainger, J. **The 'Auchincruive' potato blight forecast recorder.** *Weather* 1955, **10,** No. 7, 213-22, bibl. 10, illus. [Dep. Pl. Path., W. Scot. Agric. Coll., Auchincruive, Ayr]

A self-calculating blight forecast recorder of Beaumont periods has been developed at Auchincruive. It can be read and interpreted easily and without special skill, because the calculation as to whether the record is below, at, or above 75% relative humidity is done automatically by the instrument. It has proved very accurate. Work in Scotland has shown the necessity for having such a recording instrument as close as possible to the potato crop it is designed to serve.—M.P.

1338 Peiris, J. W. L. and Zilva, P. J. de. **Fungicidal control of late blight of potatoes at Rahangala [Ceylon].** *Trop. Agriculturist* 1954, **110,** 201-16, bibl. 5, illus.

1339 Haan, S. de. Compost en aardappelschurft. [**Compost and potato scab.**] *LandbVoorl.* 1955, **12,** No. 7, illus. [Agric. Sta., T.N.O. Groningen]

The effect of town-sewage compost (Stadsvuil-compost V.A.M.) on the incidence of scab (*Streptomyces scabies*) was noted in experiments which began in 1945. In 16 out of 34 experiments a slight increase in the incidence of scab was associated with the use of compost, but the incidence of the disease appeared to be less than might have been expected in view of the lime content of the compost.—W.J.B.

1340 Conroy, R. J. **Purple-top wilt of potato.** *Sci. Bull. 75. N.S.W. Dep. Agric.* 1954, pp. 15, bibl. 19, illus. [Received April, 1955]

The symptoms of the potato disease known in New South Wales as purple-top wilt, caused by tomato big-bud virus, are described. Evidence shows that tuber transmission of the virus is of no economic importance, but seed tubers from affected plants have a lower emergence percentage and a lower yielding potential than seed from healthy plants. For potato seed certification, a 5% tolerance at each certification inspection has been laid down for this disease.—M.P.

1341 Vicente, R. Paralización de la podredumbre del tubérculo de patata durante su periodo de germinación. [**Inhibition of bacterial rots of potato during sprouting.**] *An. Edafol. Fisiol. veg.* 1954, **13,** No. 9-10, 705-23, bibl. 5, illus., English summary pp. 722-3.

1342 Weber, Anna. Magnesiummangel. 1. Forsøg og undersøgelser med tomat, selleri og kartoffel m.m. 1948-53. [**Magnesium deficiency. 1. Investigations on tomatoes, celery and potatoes, etc. 1948-53.**] *Beret. 493. Stat. Forsøgsvirk. Plantekult.* [Contained in] *Tidsskr. Planteavl* 1955, **58,** No. 3, 421-62, English summary pp. 461-2.

1343 Ochoa, C. **Species of *Solanum* (Tuberarium) of South America. Present taxonomic status and species used in plant breeding with special reference to Peru.** *Phytopathology* 1955, **45,** No. 5, 247-50, bibl. 21. [Div. Invest. Exp. Agric. Minist. Agric., Lima, Peru]

1344 Wright, N. S. and Robinson, D. B. **Potato wildings in Canada.** *Amer. Potato J.* 1955, **32,** No. 3, 86-92, bibl. 5, illus. [Sci. Serv., Canada Dep. Agric., Ottawa]

Wildings, which are somatic variations of the potato plant, have been found in several potato varieties in Canada. They produce about 3 times as many tubers as normal plants, but these tubers, which rarely exceed 3 oz., are of little or no marketable value. Wildings are not considered a manifestation of the witches' broom virus. They are eliminated by weeding during the growing season or by using only large tubers for seed.—E.B.O.

1345 Madec, P. and Perennec, P. Contribution à l'étude de la tubérisation chez la pomme de terre. [**A study of tuberization in the potato.**] *Ann. Inst. nat. Rech. agron., Paris. Sér. B. Ann. Amélior. Pl.* 1954, **4,** No. 4, 449-67, bibl. 7, illus. [Lab. Rech. Pomme de terre, Landerneau, France] [Received June, 1955]

In a study of tuber differentiation in normal, healthy potato plants representing early, semi-early, semi-late and late varieties, all tubers were initiated within 50 days of emergence of the tops. Therefore, at harvest, all tubers are approximately of the same age whatever their size, enlargement being dependent on a different cycle of functions. The authors distinguish between earliness in initiation of the first tuber and earliness in differentiation of all tubers. Both are varietal characters and are unrelated to earliness in maturation of the tops. A study was also made of the influence of climatic conditions and of variety on the yield of tubers weighing more than 25 g. obtained between emergence and maturity of tops.—D.B.

1346 Fischnich, O. and Lübbert, G. Fruchtbildung bei Kartoffeln und Förderung der Keimschnelligkeit ihrer Samen. [**Fruit development in the potato plant and the stimulation of a more rapid germination of its seeds.**] *Beitr. Biol. Pfl.* 1955, **31,** No. 2/3, 179-206, bibl. 49, illus. [Forschungsanstalt für Landwirtschaft, Braunschweig-Völkenrode, W. Germany]

Treatment of the flower of *Solanum tuberosum* with growth substance prevented abscission of the flower and increased the number of berries produced. The best growth substances for this purpose were the Na salt of 2,4,5-T and of 2,4-D ; they were applied at concentrations of 0·125-0·5%. Flower opening proved to be the best stage for treatment. The number of berries increased with the concentration, but at high concentrations the number of "good" seeds per berry was lower than in controls. Viability was not reduced by treating the flowers with growth substance, but the period of dormancy was long. Dormancy was broken in seed of treated and normal plants by removing the tip of the seed coat at the micropylar end and simultaneously injuring the endosperm at this point.—D.B.

1347 Schwimmer, S. and others. **Potato composition. Phosphorus components of the**

white potato. *J. agric. fd Chem.* 1955, **3,** No. 3, 257-60, bibl. 17. [West. Util. Res. Br., Agric. Res. Serv., U.S. Dep. Agric., Albany 6, Calif.]

1348 NAGANNA, B. and others. **Potato pyrophosphatases.** *Biochem. J.* 1955, **60,** No. 2, 215-23, bibl. 40, illus. [Dep. Chem., Madras Vet. Coll., Madras, India]

1349 SALUNKHE, D. K. and POLLARD, L. H. **Microscopic observations of starch grains in relation to maturity of potatoes.** *Proc. Amer. Soc. hort. Sci.* 1954, **64,** 331-4, bibl. 4. [Utah Agric. Exp. Sta., Logan]

The studies reported were carried out on tubers of the varieties Russet Burbank, Kennebec and Russet Rural. In general, starch grains from the pith region had more conspicuous lamellae than those from the cortical region. Lamellae of starch grains from the pith of the apical and basal ends were similar, while lamellae of grains from the cortical region of the basal end were more conspicuous than those from the cortical region of the apical end. The lamellae of starch grains of Russet Rural tubers were more conspicuous than those of Kennebec. Tubers with a specific gravity over 1·09 had more conspicuous lamellae in the starch grains than those of tubers with a specific gravity lower than 1·06. For given specific gravity groups, the lamellae of the grains of relatively mature, early-sown tubers were more conspicuous than those of relatively immature, late-sown tubers. The hylum of the starch grains of early-sown, high specific gravity tubers was more prominent than in late-sown, low specific gravity tubers. There was no correlation between size and shape of starch grains and the maturity of tubers. It is suggested that the quality of potato tubers may be partly determined by microscopic observation of the starch grains.—P.J.B.

1350 BOLLE-JONES, E. W. **The interrelationships of iron and potassium in the potato plant.** *Plant and Soil* 1955, **6,** No. 2, 129-73, bibl. 39, illus. [Long Ashton Res. Sta., Somerset, England]

An interrelationship between Fe and K in the metabolism of potato plants was demonstrated. The application of Fe or K cured Fe-deficiency chlorosis and induced, or increased, symptoms of P-deficiency and increased the severity of Ca-deficiency symptoms. Increasing the supply of P increased the severity of Fe- and K-deficiency and reduced the severity of Ca-deficiency symptoms. K appeared to promote the mobility of Fe within the plant.—P.J.B.

1351 BP BENZIN UND PETROLEUM GESELLSCHAFT. Zur Kartoffel- und Rubenernte. [**Concerning potato-and beet-harvests.**] *Landtech. Inform.* 1954, pp. 46, illus. [Hamburg]

Twelve articles by specialists give an account of modern agricultural implements and machinery used in the cultivation, harvesting and storage of beet and potatoes.—D.B.

1352 VEENBAAS, A. De invloed van bemesting en bestrudingsmiddelen op de consumptiekwaliteit van aardappelen. [**The influence on the consumption quality of potatoes of manures, insecticides and fungicides.**] *Publ. 5. Sticht. Aardappel Stud. Cent.* 1953, 1-9. [The Hague]

The quality of potatoes generally increased with increasing applications of K up to 330 kg. K per ha. Quality improved with increasing applications of P_2O_5 up to 80 kg. per ha. Excessive quantities of N appear to have an adverse effect on quality, especially on light soils. Ammonium sulphate depressed quality more than Chilean nitrate. Among the insecticides and herbicides which are considered to affect quality adversely are BHC, copper oxychloride and Dithane.—W.J.B.

1353 FABER, W. and KAHL, E. Ergebnisse mehrjähriger Untersuchungen zur Frage der Geschmacksbeeinflussung von Insektiziden bei Kartoffeln. [**Results of several years' experiments on the effect of insecticides on the flavour of potatoes.**] *PflSchBer.* 1955, **14,** No. 11/12, 161-80, bibl. 21. [Bundesanst. für Pflanzenschutz, Wien, Austria]

The triangle test [Dreieckstest] which is described, proved to be the most sensitive and exact method for testing the flavour of potatoes. The pesticides were those used in soil treatment and control of Colorado beetle. They were applied in normal and double quantities. Products containing the "technical" hexachlorocyclohexane and the homologues of chlorobenzene were the most detrimental to potato flavour, the latter even if applied in the small quantities required for control of wireworm. Lindane and Chlordane caused a marked though less severe deterioration in flavour. Aldrin affected the flavour only when applied in quantities required for the control of white grub (2·5 kg./ha.).—D.B.

1354 KIRKPATRICK, Mary and others. **Flavor of Sebago potatoes grown in soil treated with Chlordan, Heptachlor, Dieldrin, Aldrin, or Endrin.** *J. agric. fd Chem.* 1955, **3,** No. 5, 409-12, bibl. 13. [Human Nutr. Res. Br., Agric. Res. Serv., U.S. Dep. Agric., Beltsville, Md]

In trials during 1952-4, evaluations were made of the smell and flavour of Sebago potatoes grown at 4 locations in S. Carolina, on soil treated in January with 4 lb. per ac. of Chlordan either broadcast

or in the row, or 6 lb. of Chlordan broadcast, 2 lb. of Aldrin broadcast or in the row, 2 lb. of Dieldrin broadcast, or 2 lb. per ac. of Heptachlor broadcast. In 1953, Endrin was also used at a rate of 1 lb. per ac. In 1952, only Aldrin caused off-flavours, particularly where applied in the row. In the second year at one location, treatment with 2 lb. Heptachlor per ac. resulted in a significant degree of off-flavours. In 1954, no significant off-flavours were noted following any treatment. There was evidence that flavour scores differed between locations where no insecticidal treatments were applied ; also that particular environmental conditions may be conducive to the production of off-flavours in treated crops, while similar treatments under other conditions may cause no off-flavours. —P.J.B.

1355† AMBERGER, A. Kohlenhydratstoffwechsel und Atmung einiger Kulturpflanzen und ihre Auswirkung auf Qualität und Lagerfähigkeit. [**Carbohydrate metabolism and respiration of some crop plants and their effect on quality and storage properties.**] *Landw. Forsch.* 1955, Sonderheft 6, 134-8, bibl. 8, illus. [Techn. Hochsch. München-Weihenstephan, Bavaria]

Results of several experiments with perennial ryegrass, red clover, carrot, sugar-beet and potato demonstrated that adequate K-manuring lowered the activity of hydrolytic ferments with consequent increase in the formation of high-polymer carbohydrates. A deficiency in K-manuring (as in the case of excessive N-manuring) caused an increase in the activity of hydrolytic enzymes and, consequently, the formation of low-molecular sugars. These facts were applied to hay-drying and to the storage, over several months, of moisture-containing root crops, such as potato and sugar-beet. In each case, complete fertilizer with sufficient K resulted in the greatest retention of nutrients during storage.—D.B.

1356 WATADA, A. E. and KUNKEL, R. **The variation in reducing sugar content in different varieties of potatoes.** *Amer. Potato J.* 1955, **32,** No. 4, 132-40, bibl. 19. [Colo Agric. Exp. Sta., Fort Collins]

The accumulation of reducing sugars in potato tubers causes an off-colour and off-flavour when the potatoes are cooked or processed. A trial was carried out to study the effect of storage temperatures on the reducing-sugar content of 54 potato varieties. Results showed that : (a) the reducing-sugar content increased in tubers stored at 38-41°F. for 13 weeks and, considerably more so, at 33°F. for 14 weeks ; (b) the reducing-sugar content decreased appreciably by conditioning the stored potatoes at 60-65°F. for 3 weeks ; (c) the varieties differed greatly in the amount of reducing sugar accumulated in storage, and also in their ability to change the reducing sugar into starch after it had accumulated ; (d) the percentage reducing sugar and the percentage dry matter at 60°C. were inversely correlated.—E.B.O.

1357 PAYNE, Merle G. and FULTS, Jess L. **The effect of maleic hydrazide and 2,4-D on reducing sugars and sucrose of Red McClure potatoes.** *Amer. Potato J.* 1955, **32,** No. 4, 144-9, bibl. 14. [Colo Agric. Exp. Sta.]

The level of reducing sugars in potatoes is an important factor in the non-enzymatic browning which takes place during cooking. In the investigation described potato plants were sprayed with maleic hydrazide or 2,4-D, or a combination of the two, on 23 July or 24 August, 1953. The potatoes were planted on 15 May and harvested on 4 October. Results showed that : (a) early combined treatments caused significant decreases in reducing sugars in the tubers at harvest ; (b) all late treatments caused significant increases in reducing sugars at harvest ; (c) all early treatments, 2,4-D excepted, caused significant increases in sucrose at harvest ; (d) there was no significant effect on sucrose at harvest by any late treatment; (e) after 60 days of storage, the effects on the reducing sugars were about the same as at harvest, but the effects on sucrose were not significant.—E.B.O.

1358 RAO, S. N. **Certain physiological and morphological responses in potatoes and onions induced by maleic hydrazide.** *Diss. Abstr.* 1954, **14,** No. 8, 1125. [Michigan State Coll., East Lansing]

Four varieties of potatoes were grown in 1952 and ten in 1953. Maleic hydrazide as 2500 ppm. concentrations, at rates of 3 lb. per ac., were applied as foliage sprays at different stages of development of each variety. Applications made at the same stage of maturity of each variety resulted in similar degrees of tuber injury, yield reduction and inhibition of sprouting during storage. In 1952, treatments made at 6 weeks, or more, before harvest, significantly reduced tuber yields ; in 1953, treatments made 41 (13 Aug.) or 30 days (25 Aug.) before harvest resulted in no significant tuber-yield reductions. A single application of maleic hydrazide applied on 13 or 31 July, or 13 Aug. resulted in satisfactory sprout inhibition during storage. In 1952, similar treatments made on 1 or 15 July, or 4 Aug., resulted in suppression of apical sprouting, but permitted some basal sprouting.—P.J.B.

1359 FISCHNICH, O. and THIELEBEIN, M. Weitere Erfahrungen über die Lagerung von Kartoffeln. [**Further experience in potato storage.**] *Kartoffelbau* 1955, **6,** No. 7, 158-62,

bibl. 6, illus. [Forschungsanstalt für Landwirtschaft, Braunschweig-Völkenrode, W. Germany]

Three points are discussed : (1) the possibility of distinguishing between ware-, fodder-, and seed-potatoes immediately after harvest ; (2) pressure marks on stored potatoes and their effect on germination ; (3) regulation of temperature by circulation of air as a means of preventing sprouting, shrinkage and disease in ware- and seed-potatoes during storage.—D.B.

1360 SAWYER, R. L. and DALLYN, S. L. **The effect of gamma irradiation on storage life of potatoes.** *Amer. Potato J.* 1955, **32,** No. 4, 141-3, bibl. 1, illus. [Cornell Univ., Ithaca, N.Y.]

Green Mountain potatoes were irradiated with gamma rays of cobalt^{60} and then stored at 40°, 50° or 70°F. for 10 months. Regardless of storage temperature, sprouting was inhibited by 10,000 roentgens, or higher dosages.—E.B.O.

1361 GAUS, H. and BRUER, D. Die automatische Temperaturregelung in Lagerhäusern mit Gebläsebelüftung. [**Automatic temperature regulation with blown air for (potato) storage houses.**] *Kartoffelbau* 1955, **6,** No. 6, 134-5, illus. [Inst. für Landmaschinenforschung, Braunschweig-Völkenrode, W. Germany]

1362 FISCHNICH, O. Versuchslagerhaus für Kartoffeln und andere Feldfrüchte. [**Experimental storage rooms for potatoes and other field crops.**] *Landbauforsch. Völkenrode* **4,** No. 4, pp. 2, illus. [Forschungsanst. Landwirtschaft, Braunschweig-Völkenrode, W. Germany]

SWEET-POTATOES

1363 AYCOCK, R. **The effect of certain post storage treatments on soft rot development in sweet potatoes.** *Pl. Dis. Reptr* 1955, **39,** No. 5, 409-13, bibl. 6. [S. Carolina Agric. Exp. Sta., Clemson]

Soft rot, caused by *Rhizopus* spp., is a serious disease of sweet-potato [*Ipomoea batatas*] tubers after their removal from storage for grading and repacking. In the trials reported, Porto Rico roots were cured for 6 days at 85°F. before being stored for 3 months. Dipping the roots in 1% or 2·5% concentrations of borax after grading the tubers following 3 months' storage, resulted in a great reduction in the percentage of rotted roots returned to storage after treatment. Curing the roots at 85°F. for 24 hr. after grading and repacking also significantly reduced the prevalence of soft rot ; curing for 96 hr. resulted in significantly less soft rot than curing for 24 hr. Re-curing for 48 hr. appeared to be as effective as borax dips for reducing soft rot incidence.—P.J.B.

1364 RANKIN, H. W. **The influence of sweet-potato size on the development of internal cork symptoms in the roots.** *Pl. Dis. Reptr* 1955, **39,** No. 6, 455-6, bibl. 6. [Georgia Coastal Plain Agric. Exp. Sta., Tifton]

1365 IIJIMA, T. **On the physiology and utilization of vitamin B_1 in garden crops. 3. The effects of foliage thiamin sprays on the growth and yield of sweet potatoes.** *J. hort. Ass. Japan* 1955, **23,** No. 4, 228-36, bibl. 26, illus., English summary p. 236

This paper reports the results of studies on the effects of foliar thiamine sprays on the growth and yield of sweet-potatoes. Five varieties : Norin No. 1, Norin No. 4, Kanto No. 24, Taihaku and Shijulimo were used. The results obtained were as follows. 1. Spraying thiamine solution on the leaves of sweet-potatoes promoted root growth, increased the number and length of roots, and increased the weight of stems and leaves. 2. Spraying thiamine solution on the leaves of sweet-potatoes increased the percentage of large storage roots. 3. Spraying was more effective in the first half than in the latter half of the growing season. 4. The most effective thiamine concentration for spraying was 1 ppm., when 2 cc. of the solution was sprayed on one plant at intervals of ten days.—Author's summary.

CASSAVA

1366 MALAVOLTA, E. and others. **Studies on the mineral nutrition of cassava (*Manihot utilissima* Pohl).** *Pl. Physiol.* 1955, **30,** No. 1, 81-2, bibl. 5. [Esc. Super. Agric. "Luiz de Queiroz", Univ. São Paulo, Piracicaba, São Paulo, Brazil]

In sand-culture experiments *Manihot utilissima* received macro-element treatment as follows : $N_0P_1K_1$; $N_1P_0K_1$; $N_1P_1K_0$; $N_1P_1K_1$; $N_2P_1K_1$; $N_1P_2K_1$; and $N_1P_1K_2$ in which N_1=35 g. NH_4NO_3, P_1 = 35g. $Ca(H_2PO_4)_2$ and K_1 = 28 g. K_2SO_4. The treatments were divided into four applications evenly distributed throughout the life cycle. Treatment $N_1P_1K_1$ was regarded as control. P and N proved to be the most important nutrients for cassava. Omission of P gave the lowest yield of the experiment and its addition produced a high response. The response to N in yield of root and shoot was about as large as that to P. Doubling the N in the nutrient medium gave the highest root yield of the experiment, but this was not accompanied by a significant increase in total starch yield because the starch content decreased from

32 to 24%. The explanation offered is that low-molecule carbohydrates, instead of being polymerized to starch, combined with excess amino groups to form protein compounds, the quantity of which increased by about 50% under the higher nitrogen treatment. K had no marked effect on root yield. Under Brazilian conditions it appears that field responses of cassava to P fertilization are due not wholly to low soil P but also to an unusually high requirement of cassava for P.—D.B.

OTHER

1367† ROGERS, R. E. **Clean the kale crop.** *Fmr and Stk-Breed.* 1955, **69,** No. 3426, 53, illus.

For control of weeds in kale, spraying should be carried out under good growing conditions and when the plants are at the 3- to 6-leaf stage. For charlock [*Brassica sinapis*] alone, 10 gal. sulphuric acid made up to 100 gal. per ac. are sufficient. Where fat hen [*Chenopodium album*] predominates, up to 15 gal. of acid per ac. may be necessary.—C.L.S.

1368 SCHEIJGROND, W. and VOS, H. **Investigation on the susceptibility to club root.** *Euphytica* 1954, **3,** No. 2, 125-39, bibl. 10, illus. [I.V.R.O., Wageningen, Neth.]

Data are given on the resistance to *Plasmodiophora brassicae* of a number of *Brassica* species and varieties tested in the Netherlands.—P.J.B.

FIBRE CROPS

COTTON

1369 HANAZAROV, D. [**Progress in the development of cotton production in Kara-Kalpak ASSR.**] [Russian] *Hlopkovodstvo* (*Cott. Prod.*) 1955, **5,** No. 3, 9-16.

[See also *Fld Crop Abstr.* 8 : 205.]

1370 GORJANSKIĬ, M. [**Advantages of the square-pocket method of growing cotton in the Ukraine.**] [Russian] *Hlopkovodstvo* (*Cott. Prod.*) 1955, **5,** No. 3, 29-32.

1371 UMAROV, Z. [**Soaking cotton seed.**] [Russian] *Hlopkovodstvo* (*Cott. Prod.*) 1955, **5,** No. 3, 42-4. [Taškent Agric. Inst.]

As a means of improving yields of cotton, sowings earlier than normal are being made on collective and State farms in the Soviet Union. In 1952-4, field tests on early sowings were carried out with the cotton variety 108-F at the above Institute on : (1) pre-sowing soaking of linted seed ; and (2) pre-sowing soaking of seed delinted by chemicals. The sowing dates were as follows : in 1952, the first sowing was on 2 April and the second on 10 April ; in 1953, the first sowing was on 3 April and the second on 13 April ; in 1954 the dates of the first and second sowings were delayed until 8 April and 16 April, respectively. In preliminary tests it was established that seed imbibed water most intensively in the first 12 hours of soaking ; the rate then gradually declined. For example, at the first sowing date, with 6-hours' soaking, 50% of moisture was imbibed, and with 12 hours soaking 63·3% moisture was imbibed. With 24-hours soaking, the seed contained 86·6% moisture. The variants (in both sowing dates with linted and delinted seed) comprised : (a) unsoaked seed ; (b) seed soaked in running water ; (c) seed in mounds moistened with water (500 l. per 1000 kg. seed) and treated with NIUIF-2 [Granosan, rate not stated]. The data show that in the Taškent area, for early sowing (1-5 April) the linted seed should be soaked in running water for 12 to 24 hours. Delinted cotton should be sown without pre-sowing soaking. For later sowings (10-15 April) linted seed should be soaked in running water for 48 hours, and delinted seed not longer than 24 hours (because delinting results in more rapid absorption of moisture). When the seed is treated in heaps, both linted and chemically delinted seed for both early and late sowing dates should be subjected to moistening for 6 to 12 hours. For sowing at the earlier date, delinted seed should be treated with NIUIF-2 [rate not stated].—M.H.

1372 CHRISTIDIS, B. G. **Rotation experiments with cotton.** *Emp. J. exp. Agric.* 1955, **23,** No. 89, 49-54, bibl. 13. [Hellenic Cott. Res. Inst. Sindos, Greece]

In experiments carried out at Sindos from 1933-53, 2-course, 3-course and mixed 2- and 3-course rotations, involving cereals, legumes and cotton, were studied for their effect on yield, maturity, lint length and ginning out-turn of cotton. The results showed that neither rotational cropping nor continuous cropping of cotton affected any of the characters, except for a slight but definite effect on earliness. —M.P.

1373 TUMANOV, G. [**The correct distribution of cotton varieties in Azerbaĭdžan.**] [Russian] *Hlopkovodstvo* (*Cott. Prod.*) 1955, **5,** No. 5, 27-30.

The merits of the variety 108-F [*Gossypium* sp. not given] are compared with those of the variety 1298 grown on a wide area in Azerbaĭdžan.—M.H.

1374 MOOSBERG, C. A. **A new and better cotton fiber developed.** *Ark. Fm Res.* 1955, **4,** No. 1, 1, illus.

Observations are made on a new cotton strain, NR-AHA, with very strong, coarse fibre, and with greater lustre than that of currently-grown varieties in Arkansas. This strain is being used to develop two new commercial cotton types, one for

hand- or machine-picking and the other, a storm-proof type, for hand-snapping, pulling, or machine-stripping.—P.J.B.

1375 SWEZEY, A. W. and FISHER, J. R. **The control of annual grasses in California cotton with Dalapon.** *Down to Earth* 1955, **11,** No. 1, 2-5, bibl. 5, illus. [Dow Chem. Co., Seal Beach, Calif.]

In experiments in 1952, applications of 3 or 6 lb. Dalapon per ac. at mid-season, or lay-by, gave effective control of seedling grasses (mainly *Echinochloa crus-galli*), with no visible effect on cotton. In 1953, base-directed sprays containing 8 or 12 lb. Dalapon in 50 gal. spray volume per ac., applied at lay-by, gave effective control of *Digitaria* spp. on heavy clay soil. Dalapon at 4 lb. per ac. gave only moderate control. In a second experiment in 1953, rates of 6 lb. Dalapon per ac. appeared to be optimum for controlling *Eragrostis* spp. in flowering cotton. In trials in 1954 on weed-free Hesperia fine sandy loam, the effect of mid-season and lay-by applications of Dalapon on the yield, rate of maturation, seed and fibre qualities of cotton was studied. The cotton was irrigated 11 times in all, 9 times after the mid-season and 4 times after the lay-by treatments. Mid-season treatment with 3 or 6 lb. Dalapon per ac. resulted in some decrease in lint yields. Yields where similar rates of Dalapon were applied at lay-by were not appreciably different from those of controls. The treatment had no effect on lint uniformity percentage and tensile strength, fibre quality, seed and boll weights and seed germination.—P.J.B.

1376 SNOW, O. W. and TAYLOR, J. **The large-scale control of the cotton jassid in the Gezira and White Nile areas of the Sudan.** *Mem. Res. Div. 31. Minist. Agric. Sudan* 1952, 479-502, bibl. 7, illus. [Received Feb., 1955]

Following preliminary small-scale investigations on jassid (*Empoasca lybica*) control, a large-scale spraying programme was carried out in these two areas in the 4 seasons 1946-50. Spraying with 1 lb. DDT emulsion in 100 gal. of water per feddan, (1 feddan = 1·038 ac.) was carried out, using suitably adapted tractors or helicopters. In the Gezira area, yield increases, as a result of spraying for jassid control, were often over 100 lb. of lint and 200 lb. of seed per feddan. Spraying had no adverse effect on grade of cotton. The increased yields were obtained mainly in the latest pickings. Early (October) spraying obtained greater yield response than later (November) spraying. There were consistent, though not usually significant, indications that plants from plots manured before sowing responded more to the insecticide treatments than those from unmanured plots. In the White Nile area, pre-sowing spraying after manuring gave very satisfactory results.—M.P.

1377 BEĬDEMAN, I. N. [**Transpiration of the cotton plant under different ecological conditions.**] [Russian] *Trudy Bot. Inst. V.L. Komarova* (*Trudy Inst. bot. Acad. Sci. USSR*) *Geobot. Ser. 3.* 1954, No. 9, 646-87, bibl. 39, illus.

A study of transpiration is of practical significance in connexion with the norms of irrigation for crop plants and in determining the utilization by plants of underground water. The water regime of the soil under different crops and under varying densities of the plants is determined primarily by the two factors, plant transpiration and ground-water supply. This work on the transpiration of long-stapled and medium-stapled cotton was carried out at two centres (the Experimental Improvement Station, Mugan, and the Azerbaĭdžan Institute of Agriculture, Kirovabad) to investigate: the role of transpiration in water expenditure of cotton plantations; the specificity of transpiration in different cotton varieties under varying conditions of soil and climate; and the dependence of transpiration on the soil-water regime. Data are recorded on: (1) climatic factors of the northern Mugan and Kirovabad areas; (2) water regime of long-stapled cotton in Mugan; (3) the effect of soil conditions on moisture expenditure by cotton; (4) transpiration of the long-stapled cotton variety MOS620 in Mugan on soils of different mechanical structure; (5) transpiration of medium-stapled cotton when this crop is grown on arable soil and on a fallow after lucerne in Kirovabad; and (6) comparison of transpiration intensity by different cotton varieties and of one and the same variety when grown under different climatic conditions. It is shown that (a) intensity of transpiration of long-stapled cotton in the two regions, Mugan and Kirovabad, fluctuates from 0·30 g. to 1·90 g. per 1 g. leaf per hour.; (b) the intensity of transpiration gradually declines from May to October, and is directly proportional to the soil-water supply which, in turn, depends on the soil's physical structure; (c) transpiration during the vegetation period invariably lowers the water supply in the layer of soil occupied by the roots, irrespective of irrigation; (d) with regard to (5) above, intensity of transpiration of the medium-stapled cotton on the arable soil was sharply lowered in August, but on the lucerne fallow at this time it maintained a uniform high level; (e) the amplitude of water expenditure by cotton crops in different geographical regions depends on the leaf mass per bush and leaf development, in turn, depends on climate, among other factors; (f) the amount of water given off by a cotton field during the vegetative season is about 9200 cu. m./ha., of which 79·6% is lost through the plants and 20·4% through evaporation from the soil. There is discussion of irrigation norms in relation to soil type in the two areas of Mugan and Kirovabad.—M.H.

1378 GOODMAN, A. **Correlation between cloud shade and shedding in cotton.** *Nature, Lond.* 1955, **176,** No. 4470, 39, bibl. 2. [Res. Div., Gezira Res. Fm, Minist. Agric. For., Sudan Govt]

The inability of some varieties of cotton to respond to all cloud conditions may provide evidence in favour of the mechanism of temporary carbohydrate shortage within the plant as being the fundamental cause (usually postulated) of shedding during periods of cloudy weather.—M.H.

1379 JOHAM, H. E. **The calcium and potassium nutrition of cotton as influenced by sodium.** *Pl. Physiol.* 1955, **30,** No. 1, 4-10, bibl. 14, illus. [Texas Agric. Exp. Sta., College Station]

The accumulation and distribution of Na, Ca and K in the cotton plant when grown in sand cultures was compared to similar plants grown in water solutions. A difference between results from the two experiments was found in the loci of Na accumulation. Less Na accumulated in the roots and more in the tops of plants grown in water. When 45-day-old cotton plants were deprived of their Ca supply there was an apparent change in the ability of the plants to absorb water and within five days severe wilting was noted. The addition of Na to such solutions prevented wilting and the plants appeared normal in the absence of Ca. Sodium was found to have a marked influence on the fruiting activity of 90-day-old plants grown in nutrient solutions deficient in either K or Ca during the last 45 days of their growth period. The role of Na in substitution for Ca may be a mobilization of stored Ca in the older tissues. The amount of Ca moved out of those tissues when Na was present was nearly equal to the amount of Ca accumulated in the bolls of those plants. There was no influence of Na on K movement, thus the role of Na in substitution for K in cotton cannot be ascribed to the replacement of K in one organ of the plant thereby permitting its re-utilization by other more active tissues. A parabolic relationship was found to exist between cation ration (Ca/K+Na) and yield of cotton. A ratio of about 0·7 gave maximum yields, with noticeable declines on both sides of that number.—Author's summary.

1380 GRINENKO, V. V. and ŠČEGOLEVA, V. F. [**Non-radical nutrition as a factor for increasing the physiological activity and productivity of cotton.**] [Russian] *Fiziol. Plant* (*Pl. Physiol.*) 1955, **2,** No. 2, 132-40, bibl. 25. [Bot. Inst., Acad. Sci. Tadžik SSR, Stalinabad]

The work was carried out in the Tadžik SSR during 1951-2 with the cotton variety 108-F. The tests (4 replications) were designed to study the effect of spraying the leaves with an extract of neutralized superphosphate (the concentration of the active substance being 0·5%), with special reference to the effect of treatment on total productivity of the plants and on the intensity of the plant's physiological processes. From data recorded in 9 tables it is concluded that spraying improves the water balance in the plant and strengthens the assimilative processes together with the activity of the oxidizing ferments. This improvement in metabolism enhances the ultimate yields of the crop. For example, the harvest of seed-cotton in the 1951 tests was increased from 3450 kg./ha. (control) to 4200 kg./ha. (sprayed plants).—M.H.

1381 EMPIRE COTTON GROWING CORPORATION. **Progress reports from experiment stations, season 1953-54. Northern Nigeria.** London, 1955, pp. 21.

INVESTIGATIONS REPORTED :

1. District variety tests. By H. E. King, pp. 4-7. The tests confirmed that the nucleus stock of Samaru 26 C is a small advance on commercial stock in seed-cotton yield, has a higher ginning percentage and a longer lint.
2. Seed disinfection trials. By H. E. King, pp. 8-10. Organo-mercuric seed-dressings protected seedlings and young plants against bacterial infection and there were indications of a resultant increase in yield.
3. Agronomic and fertilizer experiments. By H. E. King, pp. 10-11. Sowing after early July resulted in lowered yields. Alterations in soil fertility and plant density have little influence over the sowing date effect.
4. Insecticide trials. By H. E. King, pp. 16-21. A weekly spray application of DDT at 1 lb. per ac. in September and October controlled mirids but did not result in greater yields. Early spraying resulted in more flowers being produced on sprayed than on unsprayed plants, and earlier maturation, but late spraying gave a more even yield at each picking.—M.P.

FLAX

1382 SAUGER, R. Le lin en Seine-Maritime. [**Flax in the maritime zone of Seine Inférieure.**] *Potasse* 1955, **29,** No. 223, 47-52, illus. [Serv. Agric. de la Seine-Maritime, France]

Flax [*Linum usitatissimum*], grown for fibre, is an important crop in the coastal zone between Dieppe and Le Havre. It is grown in a 6- to 8-course rotation and thrives best in this region when it follows wheat which, in turn, has followed red clover [*Trifolium pratense*]. Advice is given on preparation of the soil, manuring and care of the crop. Varieties recommended for this area are Concurrent, Wiera, Fivel, Hollandia and Percello. Seed is sown at a rate of 150-160 kg./ha. between 20 March and 15 April.—D.B.

1383 SIMOENS, M. Rapport sur des champs d'essai de lin établis en Flandre occidentale au cours de l'année 1953. [**Report of flax trials in Eastern Flanders during 1953.**] *Rev. Agric., Brux.* 1955, **8,** No. 7, 918-28.

The performance of 7 varieties of flax, namely, Arc-en-Ciel, Concurrent, Diana, Formosa, Solido and Wiera, grown on several estates in Belgium, is recorded. The report takes into account yields of straw and grain and the quality of the straw and fibre.—D.B.

1384 GALUN, E. **The effect of mechanical injury, seed treatment, soil types and soil micro-organisms on the germination of flax seed in Israel.** *Proc. internat. Seed Test. Ass.* 1955, **20,** No. 1, 46-56, bibl. 21. [Hebrew Univ., Rehovot, Israel]

Studies are reported on the effect of seed-coat injury, fungicidal seed treatment, soil type and soil micro-organisms on the emergence of Hollandia fibre flax. Combine-threshing of the seed markedly reduced germination, and was only partially remedied by the use of Fernasan, N.I. Granosan and Special Panogen. The beneficial effect of these seed treatments was relatively more pronounced where the seed was sown in heavy soils. The emergence of damaged seed was markedly lower in heavy than in light soils. Of 7 micro-organisms isolated from flax seedlings, *Mucor* sp., *Fusarium* sp., and most particularly *Rhizoctonia solani* and *Trichoderma lignorum*, caused reduced germination of damaged seed.—P.J.B.

1385 GEERDES, J. D. **The constitution of flax straw hemicellulose.** *Diss. Abstr.* 1955, **15,** No. 3, 335. [Univ. Minnesota]

1386 LEHR, J. J. and WYBENGA, J. M. **Exploratory pot experiments on sensitiveness of different crops to sodium: C. Flax.** *Plant and Soil* 1955, **6,** No. 3, 251-61, bibl. 34, illus. [Pl. Nutr. Res. Lab., Chilean Nitrate Agric. Serv., Wageningen, Neth.]

In 3 pot trials, Na, applied either in a nitrate form, or as Dusarit in an artificial soil complex, stimulated the vegetative growth of flax, even in the presence of an ample K supply. Na also improved fibre quality, this effect being greatest where 6% of the exchangeable bases present consisted of Na. Excessive amounts of Na, particularly in the presence of large amounts of K, induced Ca deficiency in the plants, resulting in low grain yields and wilting of the shoot apex.—From authors' summary.

1387 FREDERIKSEN, P. S. Nogle synspunkter på spindhørrens kaliumbehov. [**Some aspects of the potassium requirement of flax.**] *Lin* 1954, **8,** No. 5, 69-78, bibl. 6. [Dansk Hørforskningsinst., Viby J., Denmark]

[See also Abs. 1006.]

HEMP

1388 BORTHWICK, H. A. and SCULLY, N. J. **Photoperiodic responses of hemp.** *Bot. Gaz.* 1954, **116,** No. 1, 14-29, bibl. 20, illus. [Pl. Industr. Sta., Beltsville, Md (H.A.B.) Argonne Nat. Lab., Lemont, Illinois (N.J.S.)] [Received May, 1955]

The results show how photoperiodic control can be used: (a) to produce several generations of *Cannabis sativa* in 1 year, (b) to synchronize the flowering dates of plants that differ in earliness and (c) to stimulate the production of male flowers or female plants for self-pollination. To produce this last type of plant in the field, sowing should be delayed as long as possible.—D.B.

KENAF

1389 JONES, M. D. and others. **Isolation of kenaf for seed increase.** *Agron. J.* 1955, **47,** No. 6, 256-7, bibl. 5. [Com. Co-op. Fibr., Cuba]

Data are given on the extent of natural crossing in kenaf (*Hibiscus cannabinus*) grown for seed in Cuba and recommendations are made for the isolation of breeding material for seed multiplication. The percentages of crossing in 1952 ranged from 0·74 between adjacent plots, to 0·02 in plots separated by 60 rods; in 1953, respective percentages were 1 and 0·14. Border rows were ineffective in preventing crossing, which was attributed to the random behaviour of visiting honey-bees. With small seed multiplication blocks, it was thought best to isolate them as far as possible from other plots or fields; for large commercial seed plots, a minimum isolation distance of 5 rods was recommended.—P.J.B.

OIL CROPS

LINSEED

1390 FREDERIKSEN, P. S. Kvaliteten af dansk og oversøisk linolie. [**The quality of Danish and foreign linseed oil.**] *Lin* 1954, **8,** No. 6, 85-91, bibl. 15. [Dansk Hørforskningsinst. Viby J., Denmark]

Literature on the course of oil formation in flax and linseed is reviewed and data are given of the oil content and iodine number of linseed and flax seed in Denmark. In two series of trials in Denmark during 1944-52, the oil content of linseed varied from 37·8 to 39·6% and the iodine number from 198 to 205. In trials with flax during 1950-3, the oil content of the seed ranged from 33·6 to 35·4% and the iodine number from 194 to 206. There appeared to be more variation in seed-oil content in flax than in linseed. In general, flax seed has a lower oil content and a higher iodine

number than linseed in Denmark. The oil content and iodine number of Danish linseed were higher than in imported linseed. The influence of climate on these factors and the date of harvest of linseed are reviewed.—P.J.B.

SUNFLOWER

1391† BLACKMAN, G. E. and ROBERTSON-CUNINGHAME, R. C. **Interrelationships between light intensity and the physiological effects of 2:4-dichlorophenoxyacetic acid on the growth of *Helianthus annuus*.** *J. exp. Bot.* 1955, **6,** No. 17, 177-211, bibl. 25, illus. [Dep. Agric., Univ. Oxford]

RAPE

1392† FUSSELL, G. E. **History of cole (*Brassica* sp.).** *Nature, Lond.* 1955, **176,** No. 4471, 48-51, bibl. 34.

1393 HELLSTRÖM, N. **Investigations on oil turnips and oil rape. 1. A survey of composition in connection with hardening.** *Acta agric. scand.* 1954, **4,** No. 2, 302-10, bibl. 7. [Organic Chem. Inst., Roy. Agric. Coll. Sweden, Uppsala]

The results are given of determinations of the residues after fat extraction and extraction with dilute alcohol, and of the ash and crude-protein contents of untreated, fat-extracted and ethanol-extracted residues, in plants of two varieties of turnip rape [*Brassica campestris* var. *oleifera*] and two of rape [*B. napus* var. *oleifera*], with a view to following the process of winter-hardening following the subjection of the plants to cold treatments. Changes in the roots due to winter-hardening were negligible. After winter-hardening, the amount of residues in the leaves after extraction with ethanol showed a significant reduction, both where the values were corrected or not corrected for ash and crude-protein contents. The values obtained after ethanol extraction were considered to provide a simple means of following the process of winter-hardening in these species. The changes demonstrated were thought to be due to the transformation of polysaccharides, such as starch, into simple sugars.—P.J.B.

1394 HELLSTRÖM, N. **Investigations on oil turnips and oil rape. 2. A survey of carbohydrate content in connection with hardening.** *Acta agric. scand.* 1954, **4,** No. 2, 311-16, bibl. 7. [Organic Chem. Inst., Roy. Agric. Coll. Sweden, Uppsala]

Data are given of the reducing- and total sugar-content of fat-extracted samples of plants of two varieties of turnip rape [*Brassica campestris* var. *oleifera*] and two of rape [*B. napus* var. *oleifera*], following winter-hardening treatments. The fat-extracted samples were treated with 75% ethanol for the sugar determinations. The results showed an increase in both reducing and total sugars following winter-hardening treatment ; it was also shown that changes in crude-protein content occurred, which appeared to account for the fact that a reduction in the amount of residues obtained by the treatment of fat-extracted residues with ethanol [see previous abstract] was not wholly counterbalanced by increases in sugar content following the winter-hardening process.—P.J.B.

OTHER

1395 KIENITZ, E. and POLSTER, H. Untersuchungsergebnisse über Nährstoffansprüche der grossen Klette (*Arctium lappa* L.). [**Results of experiments on the nutrient requirements of the burdock (*Arctium lappa* L.).**] *Die Pharmazie* 1952, No. 9, 599-604, bibl. 5, illus.

Experiments with the culture of *A. lappa* on clear fellings or other forest lands as an interim fibre and oil-seed crop were largely negative. Its yields in both respects were uneconomic. *A. lappa* has very low resistance to acidity and only thrives on heavy, rich soils. The exacting nutrient requirements of burdock makes it a useful soil indicator.

1396 MAZZANI, B. Notas. Introducción de plantas oleáginosas nuevas para Venezuela. 1. *Salvia hispanica* L. [**Introduction of new oil-yielding plants into Venezuela. 1. *Salvia hispanica*.**] *Agron. trop. Maracay* 1955, **4,** No. 1, 43-6, English summary p. 46. [Cent. Invest. Agron. Maracay, Venezuela]

Information is given on *Salvia hispanica*, an annual plant grown in Mexico, and the oil extracted from its seed harvested in Venezuela. The percentage oil in the seed (dry-weight basis) was about 32%. The cultivated plants were erect throughout the growing season. The spikelets were uniformly 50-80 cm. above ground-level. There was little loss of seed during harvest and the seed was easily threshed. The size of the spikelets and the number of spikelets per plant were very variable. The results of an analysis of the oil produced from the seed are tabulated. *Salvia hispanica* oil is comparable with linseed oil.—W.J.B.

GENERAL

1397 BJÖRKLUND, C. M. Erfarenheter och resultat från försök i oljeväxter. [**Experiences and results of research on oil-seed crops.**] *Svensk Frötidn.* 1954, **23,** No. 4, 45-54.

The results are given of trials with a number of oil-seed crops in Sweden. In trials with winter rape, Lembke was used as a standard and the trials lasted for periods of 1-4 years. In Østergotland, Lembke was outyielded by Matador A, Matador B and Regal, by 75, 50 and 65 kg. oil per ha., respectively. In Gotland, Matador A, Matador B and Matador C outyielded Lembke by 30, 70 and 30 kg. oil per ha., respectively. In the Mälar Hjälmar district, Lembke was outyielded by Matador A, B and C by 40, 25 and 225 (one year only) kg. oil per ha., respectively. In trials over the whole of Sweden, Matador A, B and C and Regal outyielded Lembke by 35, 35, 70 and 20 kg. oil per ha., respectively. In terms of yields, central Sweden appeared to be as good as Skåne for winter rape production. Interest in winter turnip rape has increased in central Sweden by reason of its winterhardiness, though its oil yields are lower than those of winter rape. In trials over the whole of Sweden, using Lembke winter turnip rape as a standard, Storrybs gave equal oil yields and Rapido and Gruber inferior yields. Spring rape cultivation has declined in Skåne and central Sweden. Of named varieties, Svalöf's Regina, Regina B and Regina II have been tested. In 94 trials over the whole of Sweden, Regina II significantly outyielded Regina B by 55 kg. seed per ha. Cultivation of spring turnip rape is limited mainly to peat soils and few trials have been carried out with it. Of named varieties, Gute has outyielded Fenno by 190 kg. seed per ha. in 40 trials. In trials with white mustard, Svalöf's Primex has outyielded commercial strains by 25 kg. seed and 15 kg. crude oil per ac. in 32 trials. In trials with linseed over the period 1946-52, Svalöf's Renodlat (Argentinian selection) was used as a standard. Oil yields of Valuta (Romanian selection), Renodlat II, Vaanila (Finnish) and Adoptiv (Danish) were + 55, + 20, + 10 and — 10 kg. per ha. compared with those of Renodlat, respectively. Poppy oil seed cultivation has declined considerably. Varieties tested have included Mahndorfer, Peragis, Sv. Flora and Sv. 48/31. In 25 trials, Mahndorfer outyielded Peragis by 25 kg. seed per ha. Flora, a new variety, is a considerable improvement on the older varieties. Data are given of the results of manurial trials on oil-seed crops.—P.J.B.

1398 PROKOFJEV, A. A. [**The formation of oil in plants.**] [Russian] *Usp. Sovrem. Biol.* (*Adv. mod. Biol., Moscow*) 1955, **39,** No. 2, 129-53, bibl. 55, illus.

This review article contains information on the following: features of plant oils; dynamics of oil accumulation in seeds of oil plants; mechanism of oil formation in plants; effect of the nutrient supply to fruits on oil accumulation in seeds; the role of phosphorus in oil synthesis; oxidizing ferments and synthesis of oil; the influence of light on fruit and seed formation and on oil content of the seed.—M.H.

LAND USE, SURVEYS AND MANAGEMENT

1399† AFRICAN LAND DEVELOPMENT BOARD. **African Land Development in Kenya. July to December 1954. Report by Executive Officer.** [n.d.], pp. 20, illus. 80. [Nairobi]

This is a well-illustrated report on the progress of the work of the African Land Development Board, previously known as the African Land Utilization and Settlement Board. The irrigation, grazing, land settlement and development schemes in the numerous districts of Kenya are covered.—M.P.

1400† RENSBURG, H. J. van. **Land usage in semi-arid parts of Tanganyika.** *E. Afr. agric. J.* 1955, **20,** No. 4, 247-53, bibl. 10, illus. [Vet. Res. Lab., Mpwapwa, Tanganyika]

Major problems such as unreliable rainfall, lack of knowledge on adequate land use, and lack of suitable planting material, are considered, with special reference to farming the semi-arid thicket areas of central Tanganyika. A semi-intensive farming system is recommended, with a 4-year crop-rotation between bush clearing and ley establishment. Drought-resistant and quick-maturing crop and pasture species are essential for economic returns. Selected varieties of crops such as sorghum, maize, bulrush millet (*Pennisetum typhoideum*) are suitable. The grasses showing most promise for leys are *Cynodon plectostachyus*, *Cenchrus ciliaris* and an Iringa strain of *Chloris gayana*. The legumes *Glycine javanica*, lucerne and velvet beans also yield well.—M.P.

1401 GUINIER, M. L'équilibre agro-sylvo-pastoral vu par des forestiers. [**Equilibrium between arable cultivation, forestry and grazing from the standpoint of the foresters.**] *C.R. Acad. Agric. Fr.* 1955, **41,** No. 2, 63-8.

1402 WINBERG, I. P. Östergötlands naturliga jordbruksområden. Kort sammandrag av en experimentundersökning. [**The natural agricultural regions of Östergötland. A short summary of an experimental study.**] *K. LantbruksAkad. Tidskr.* 1954, **93,** No. 2-3, 199-217, bibl. 22.

1403 PAPADAKIS, J. Posibilidades agrícolas de

Misiones. [**Agricultural possibilities of the Misiones Province of Argentina.**] *Idia* 1954, No. 82, 4-16, bibl. 8, illus.

The climatic regions, soils, natural vegetation and agricultural possibilities of Misiones are described. Possible means of restoring soil fertility after arable crops by the use of grasses and legumes are discussed. Annual legumes such as *Stizolobium* sp. and soyabean are more easily grown than perennial legumes. Maize intersown with soyabean is recommended as a fodder crop. Maize, soyabean and cassava are the most promising annual field crops.—W.J.B.

1404† HUDAULT, C. Les possibilités de l'agriculture corse. [**The possibilities of Corsican agriculture.**] *Bull. tech. Inform.* 1955, No. 99, 301-14, bibl. 6, illus.

1405 MOIR, T. R. G. **Some aspects of agricultural development in the Sudan.** *Mem. Fld Div. 5. Sudan Minist. Agric.* 1954, pp. 29, bibl. 1. [Received April, 1955]

Agricultural development under irrigation and in the rainlands of the different regions of the Sudan is discussed.—M.P.

1406 JEWITT, T. N. **Gezira soil.** *Bull. 12. Sudan Minist. Agric.* 1955, pp. 83, bibl. 52, illus.

The work done in the past 40 years on Sudan Gezira soil is reviewed and summarized, with special emphasis on soil science. Other aspects dealt with, in varying detail, include : agricultural systems and rotations, crop yields, nutrient and irrigation requirements of cotton and the use of *Atriplex muelleri*, which is capable of removing large quantities of sodium, for soil improvement.—M.P.

1407 MCCALL, A. G. and LEA-WILSON, K. L. **Some notes on Zandeland.** *Mem. Fld Div. 6. Sudan Minist. Agric.* 1954, pp. 21. [Received April, 1955]

The progress of the Zande scheme, begun in 1945 for the social and economic development of the Azande people of the Sudan, is outlined. The difficulties encountered in the change from a shifting subsistence agriculture to one of continuous cultivation, with cotton as the main cash crop, are discussed.—M.P.

1408† ERNST, L. F. and FERRARI, Th. J. Verbetering van de watervoorziening van een zandgebied door middel van verhoging van de grondwaterspiegel. [**Improvement of water supply by raising the groundwater level of a sandy soil.**] *Landbouwk. Tijdschr., Wageningen* 1955, **67,** No. 4, 245-59, illus., English summary p. 259. [Agric. Exp. Sta. and T.N.O. Soil Inst., Groningen]

A project is described whereby the groundwater level of about 1500 ha. in North Brabant is to be raised by means of damming the River Aa. The water-level deficiency in different parts of the area was mapped and the economic advantage to be derived from improvements in crop yields (calculated from experiments in which the effect of groundwater level on grass, oats and rye yields was determined) was calculated. In these experiments, with progressively thicker humus-containing layers and with progressively finer types of sand the critical groundwater level (below which there was a 10% reduction in the yield of oats) occurred at increasingly greater depths below the surface. For the coarsest type of sand and the shallowest humus-containing layer the critical level was 90 cm. below the surface and for the finest type of sand and the deepest humus-containing layer the critical level was 170 cm. below the surface. It was calculated that raising the groundwater level of the river Aa region would increase crop yields by 10-25%, depending on annual rainfall.—W.J.B.

1409 HUNT, I. V. and FARRANT, D. P. **Farming an ash-dump.** *J. Brit. Grassl. Soc.* 1955, **10,** No. 2, 127-34, bibl. 11, illus. [West Scot. Agric. Coll. and Brit. Electric. Auth., S.W. Div.]

The successful reclamation of an ash-dump (at the site of a coal-fuelled electric-power station) and the establishment on the dump of a small farm, growing normal farm crops, are described. The soil was excavated before dumping began, and later tipped on the surface of the dump to a depth of about 2 ft. The soil analysis of the top soil and the physical characteristics of the ash are tabulated. A basal NPK dressing was applied to the top-soil in February, 1949, before the sowing of the grass/clover/herbs seeds mixture in the same month. In 1950, normal or above-normal yields were obtained from crops of marrow-stem kale, potatoes, mangels and dredge-corn grown on the same ash-dump. The costs of reclamation, which represent a small charge on the operation of the waste-disposal scheme, are discussed.—W.J.B.

1410 SPAAN, N. F. De praktische toepassing van het bedrijfseconomisch onderzoek (2). [**The practical application of studies on the economics of farm management. 2.**] *Landbouwk. Tijdschr., Wageningen* 1955, **67,** No. 3, 169-79. [Landb.-Econ. Inst. Neth.]

1411 JOLLY, A. L. **Small-scale farm management problems. A paper presented at the Conference on Education and Small-scale Farming held in Trinidad, October, 1954.** *Trop. Agric., Trin.* 1955, **32,** No. 2, 80-7, bibl. 1. [Imp. Coll. Trop. Agric., Trin.]

FARMING SYSTEMS AND PRACTICES

1412† LESKE, K. B. **The farms of our Mid-North [S. Australia]. A survey of farming practices in the period 1945-1950.** *J. Dep. Agric. S. Aust.* 1955, **58,** No. 8, 332-42, illus.

1413 JOO-JOCK, L. **Tradition and peasant agriculture in Malaya.** *Malay. J. trop. Geogr.* 1954, **3,** 44-7.

The marked effect of traditional belief on agricultural practices, especially with regard to the nature and timing of the various operations involved in rice-cultivation, is decribed.—W.J.B.

1414 BOUCHET, P. Le secteur expérimental de modernisation agricole des Terres Neuves : Boulel (Sénégal). [**The experimental area of agricultural modernization of the Terres Neuves : Boulel, Senegal.**] *Agron. trop., Nogent* 1955, **10,** No. 2, 174-216, illus., English and Spanish summaries pp. 214-16.

The "Secteur de Modernisation de Kaffrine", founded in Jan., 1955, continues the work of the "Bloc Expérimental de l'Arachide" under a different form of management. The environment and the methods adopted for developing agriculture in the Terres Neuves, an area of about 40,000 ha., are described. First results are given. There is one rainy season lasting 5 months with 650-750 mm. of rain. The 4 years' rotation practised is : groundnuts/millet/groundnuts/sorghum for green manure. The groundnut variety grown is Bambey 28-206, late, erect and suitable for mechanized cultivation. The millets [*Pennisetum* sp.] grown are of the Sanio type which yield more than the early millets and sorghums. Their spikes, being awned, are resistant to birds.—E.B.O.

1415 HAUSER, G. F. **Comparison of the Afghan plough and tillage practices with modern implements and methods.** *Emp. J. exp. Agric.* 1955, **23,** No. 89, 75-80, illus.

In the wheat district of Kabul and the sugar-beet area of Baghlan, experiments were carried out in which modern methods of cultivation were compared with the local traditional ones. No fertilizers were applied. With both wheat and sugar-beet, results favoured the use of the modern steel plough and harrow. Grain yields of the wheat variety Regent were 18·6% greater and straw-yields 13·7% lower than on the traditionally sown plots. The water requirements were similar with both methods. In sugar-beet trials with the variety Eagle Hill, root and sugar yields were 23% and 27% higher, respectively, with modern methods, the ploughing depth attained being greater and soil water storage being more effective.—M.P.

1416 FEDOROVSKIĬ, M. T. [**The depth of ploughing chernozems under winter crops in the Ukrainian steppe.**] [Russian] *Počvovedenie (Pedology)* 1955, No. 2, 16-31, bibl. 21, illus. [Ukrainian Sci. Res. Sta. for Oil-Crops]

[See *Soils and Ferts* 18 : 1695.]

1417† STIFTINGER, J. Bericht über dreijährige Versuchsergebnisse des Fruchtfolgedüngungsversuches in Galgenau bei Freistadt O.Ö. [**Report on 3-year crop rotation manurial trials in Galgenau near Freistadt, Upper Austria.**] *Landw. Pr. Umschau* 1955, No. 3, pp. 18. [Landw. Abt., Österreichische Stickstoffwerke A.G., Linz, Austria]

The results of trials in which red clover, oats, winter rye, silo maize, a winter fodder mixture, potatoes and fodder-beet were given increasing levels of N fertilizer in addition to basal manuring are tabulated and graphed. An examination of costs and returns proved that it is profitable to use commercial fertilizers in this region which has a harsh climate and wet, acid soil.—D.B.

1418† OSVALD, H. Nuvarande utveckling inom växtföljderna. [**Current trends in crop rotations (in Sweden).**] *K. LantbrAkad. Tidskr.* 1954, **93,** No. 1, 58-73.

The background of current crop rotation practices in Sweden is reviewed and discussed and suggestions are made for a better use of rational rotation practices.—P.J.B.

1419 HANSEN, F. Forsøg med grøngødning 1942-1953. [**Trials with green manures, 1942-1953.**] *Beret. 495. Stat. Forsøgsvirk. Plantekult.* [Contained in] *Tidsskr. Planteavl* 1955, **58,** No. 3, 484-510, English summary p. 605.

A report is given of trials at 3 locations on light, dry sandy soils in Denmark on the use of leguminous green-manure crops undersown in barley, on the cereal cover crop and on the succeeding crops. Leguminous crops used included : *Medicago lupulina, Ornithopus sativa* and *Anthyllis vulneraria.* The effect of the legumes on the yield of the barley cover crop was slight and not consistent. *O. sativa* resulted in a considerable increase in the straw yield of the barley, while the other two legumes had only slight effects on straw yield. The yields of the legumes during autumn after the harvest of the cover crop were small. Where the legumes were ploughed under in late autumn or winter, their effect on following root crops amounted to an equivalent of 15 to 50 kg. N as calcium nitrate per ha., and, in individual cases, up to 60 kg. N per ha.

Where the legumes were ploughed under in September during the course of normal stubble cultivations, their effect on succeeding crops was very small. The after-effect of *O. sativa* was slightly less than that of *M. lupulina*, *Trifolium pratense* or *A. vulneraria*, which were very similar in this respect. The effect of the legumes was more noticeable in light, sandy soils than in clay soils. The effect of the legumes appeared to depend both on their effect on the N content of the soil and on the soil structure.—P.J.B.

1420 PONNAIYA, B. W. X. ***Ipomoea carnea* turns out to be an ideal border green manure plant.** *Indian Fmg* 1955, **4,** No. 12, 14-15, illus. [Madras Dep. Agric., India]

1421 STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR. DENMARK. Foreløbig meddelelse om saedskifteforsøg med vanding. [**Preliminary report of crop rotation trials with irrigation,**] *Medd. 513. Stat. Forsøgsvirk. Plantekult.* [Contained in] *Tidsskr. Planteavl* 1955, **58,** No. 3, 453-4.

In trials during 1950-3 in Denmark, crops in the following rotation were irrigated: oats, rye, swedes, barley with undersown clover/grass, 2 years clover/grass. The crops were manured so as to provide optimum nutrient supplies. Yield increases in oats following irrigation ranged from 4·3-20·4 hkg. grain per ha. and 1·6-17·1 hkg. straw per ha. With rye, irrigation increased grain yields by 0·2-14·6 hkg. per ha. and the yields of undersown barley from 0·9-7·8 hkg. grain per ha. With swedes, irrigation resulted in yields ranging from 162 hkg. per ha. less, up to 125 hkg. per ha. more, than those of controls. Oats appeared to respond best to irrigation, though in these trials, the previous grass/clover crop on irrigated oat plots was much better than on non-irrigated plots.—P.J.B.

1422† PENMAN, H. L. **Water control for increased crop production.** *Advanc. Sci.* 1955, **12,** No. 45, 29-32, bibl. 7.

This is an integrated summary of 4 papers on irrigation read at the 1954 Meeting of the British Association. [See also Abs. 248.] "It is becoming clear that in England the normal summer rainfall is not sufficient to maintain an adequate water supply and that supplementary irrigation offers a way of increasing food production to an extent that, at present, is possible in no other way."—M.P.

1423 WESSELING, J. and WIJK, W. R. VAN. **Optimal depth of drainage.** *Neth. J. agric. Sci.* 1955, **3,** No. 2, 106-18, bibl. 21, illus. [Lab. Phys. Met., Wageningen]

The optimal depth of drainage for field and herbage crops in the Netherlands is discussed. On clay soils, arable crops are unlikely to suffer from water shortage when water tables are about 130 cm. below the surface. Grass crops kept short by mowing or grazing may suffer from water shortage when the water table is lower than 50 cm. below the surface.—W.J.B.

1424 KOPPEJAN, A. W. G. De motorisatie van de Nederlandse landbouw. [**The mechanization of Dutch agriculture.**] *Landbouwk. Tijdschr., Wageningen* 1955, **67,** No. 5, 315-24, English summary pp. 323-4.

1425 MAYNE, J. E. **Progress in the mechanization of farming in the colonial territories—2. A visit to the British Territories in West Africa.** *Trop. Agric., Trin.* 1955, **32,** No. 2, 95-9, bibl. 3.

Technical progress in farm mechanization in West Africa, especially in connexion with bush-clearing, weed control and rice-growing, is described.—W.J.B.

1426† BUNTING, A. H. and others. **A review of methods of land clearing.** *J. Sci. Fd Agric.* 1955, **6,** No. 3, 121-32, bibl. 12.

The problems of land clearing are presented in their ecological and agricultural setting based on experience gained in tropical Africa alone. Land clearing in primitive farming and for mechanized farming is considered.—M.P.

1427† TRIENES, I. H. Windschutz und künstliche Hecke. [**Wind-breaks and artificial hedges.**] *Dtsch. landw. Pr.* 1955, **78,** No. 11, 159-60, illus. [Forschungsanst. Landw., Braunschweig-Völkenrode, W. Germany]

The "hedges" described are constructed of two layers of 2-inch-mesh wire-netting filled in with any suitable material so as to allow 40-50% of the wind to pass through; this is considered to be the optimum density of a windbreak. An example is given of an artificial hedge capable of withstanding a gale of 120 km./hr. on open land. Artificial hedges have the following advantages, among others. There is no loss of cultivable land, whereas a natural hedge uses 2-5% of the area. Artificial hedges offer no root competition with the crop plant, nor do they harbour pests. They can be erected quickly, their effect is immediate, and they can be removed when the presence of a windbreak retards the growth of the crop. The chief objection to them is the aesthetic one.—D.B.

SOIL AND WATER CONSERVATION

1428 MAKKINK, G. F. Toetsing van de berekening van de evapotranspiratie volgens Penman. [**A test of Penman's calculations of evapotranspiration.**] *Landbouwk. Tijdschr., Wageningen* 1955, **67,** No. 4, 267-82, bibl. 10, illus., English summary pp. 281-2. [Cent. Inst. Agric. Res., Wageningen, Neth.]

Penman's calculations of evapotranspiration from a sward of short grass were checked in 1953 under Dutch conditions, using weighable monolith lysimeters. The calculated values of potential evapotranspiration were about 12% below the measured values. The calculated values for evaporation of water were about 20% above the observed values using an evaporation pan. The discrepancy between actual results and those obtained using Penman's formulae was resolved by the introduction into the formulae of an adaptation for the roughness of the vegetation surface.—From author's summary.

1429 EVANS, A. C. **A study of crop production in relation to rainfall reliability.** *E. Afr. agric. J.* 1955, **20,** No. 4, 263-7, bibl. 3, illus. [Overseas Fd Corp., Nachingwea, Tanganyika]

Owing to the narrow margin of rainfall for successful African and mechanized agriculture in southern Tanganyika, full utilization of rain falling between December and April is essential. For good maize yields 21 in. of rain are required within 100 days, and for groundnuts 23 in. within 120 days, of sowing, but these amounts of rain are obtainable in only 67% of the seasons. Measures which can be taken to minimize the effect of low rainfall during the growing season are discussed. They include the prevention of surface run-off by tie-ridging, variation of the planting dates in relation to rainfall and early cultivation of land for later-sown crops to obtain maximum moisture conservation.—M.P.

1430† RENSBURG, H. J. van. **Run-off and soil erosion tests, Mpwapwa, Central Tanganyika.** *E. Afr. agric. J.* **20,** No. 4, 228-31, bibl. 3, illus. [Dep. Vet. Sci. and Anim. Husb., Tanganyika]

Determinations from 1946-54, of the percentage run-off and the amount of soil lost per ac. annually, confirmed that heavy storms at the start of the rains did much damage, especially where protection of the soil surface is inadequate through overcultivation. The perennial grasses *Cynodon plectostachyus, Cenchrus ciliaris* and *Chloris gayana* provide excellent protection against erosion, even when closely grazed or after cutting.—M.P.

1431 BEALE, O. W. and others. **The effects of mulch tillage on runoff, erosion, soil properties, and crop yields.** *Proc. Soil Sci. Soc. Amer.* 1955, **19,** No. 2, 244-7, bibl. 1. [S. Carolina Agric. Exp. Sta., Clemson]

1432 BARNES, O. K. **Effect of chemical and tillage summer fallow upon water infiltration rates.** *Agron. J.* 1955, **47,** No. 5, 235-6. [Wyoming Agric. Exp. Sta., Laramie]

Trials were carried out in north-western Wyoming to compare rates of water infiltration into soil subjected to the following tillage treatments for summer fallow : (a) stubble mulch, with no tillage, but the application of Dalapon and 2,4-D ester to control broad-leaved and grassy weeds as required during the season, (b) clean cultivation, with season-long sub-surface tillage, (c) spring ploughing, followed by season-long sub-surface tillage. Weeds were effectively controlled by all treatments. Simulated rainfall at a rate of 2·5 in. per hour was applied. In a 1-hour test, treatments (a), (b) and (c) resulted in total infiltration amounts of 1·52, 0·98 and 1·28 in. ; the differences were particularly marked during the second half-hour of the tests. Further trials are needed to determine the effect of these treatments on crop yields, but the use of stubble mulch, with herbicides, appears to hold promise as a method of cultivation for dryland conditions.—P.J.B.

1433† PRESNJAKOVA, G. A. [**Terracing and furrowing the autumn fallow for controlling soil erosion and drought.**] [Russian] *Počvovedenie* (*Pedology*) 1955, No. 2, 48-60, bibl. 29, illus.

[See *Soils and Ferts* 18 : 1710.]

1434† NEWMAN, J. C. **Tumut Catchment area—survey of vegetation and erosion. Part 3. Vegetation.** *J. Soil Conserv. N.S.W.* 1955, **11,** No. 2, 95-111, illus.

A general description of the vegetational associations found in this area is given, mention being made of the effect of fire on the different communities.—M.P.

1435† BOLE, N. C. **Systematic land classification surveys for soil conservation planning in Damodar Valley.** *J. Soil Wat. Conserv. India* 1954, **2,** No. 4, 186-92, illus.

Soil-, land utilization- and erosion-surveys are described.—W.J.B.

1436 BOMMER, D. Untersuchungen über die Ernterückstände von Feldfutterpflanzen in verschiedenen Höhenlagen. [**The plant remains of arable fodder crops in several upland locations.**] *Z. Acker- u. Pflbau* 1955,

99, No. 2, 239-58, bibl. 32, illus. [Inst. für Grünlandwirtschaft und Futterbau, Justus-Liebig Hochschule, Giessen, Germany]

The paper is confined to the effect of crop roots on the physical and chemical properties of the soil, the crops being winter catch crops, summer catch crops, and fodder plants grown as a main crop.—D.B.

1437† JEFFERSON, J. H. K. **A note based on field experience in planning hafir excavation programmes.** *Mem. Fld Div. 4. Minist. Agric. Sudan. Sudan Notes and Rec.* 1953, **33,** 224-43, illus. [Received Feb., 1955]

Information is given on the important factors to be considered when planning a hafir (excavated surface-water storage reservoir) programme in the Sudan. These are: water source, soil, capacity, above-ground storage, medical precautions, costs, roads and maintenance.—M.P.

1438† ROOD, E. and GLATTHAAR, J. O. **Conservation farming on the Langgewens cereal experimental farm.** *Fmg in S. Afr.* 1955, **30,** No. 350, 253-5 and 258, illus.

The farm is representative of those in the western districts of Cape Province where the annual rainfall is 14·5 in. Soil conservation measures and farming systems employed on the farm, with particular reference to pasture and fodder crop production, are described.—M.P.

1439 TAMM, O. Till frågan om bestämning av klimatets humiditetsgrad i Sverige. [**On the question of determining the degree of humidity of the Swedish climate.**] *K. Lantbr-Akad. Tidskr.* 1954, **93,** No. 2-3, 105-22, bibl. 11, French summary pp. 120-1.

A critical discussion is given of the validity for Swedish conditions of Martonne's index of aridity N (t + 10), where N = mean annual precipitation in mm. and t = mean annual temperature in °C., and of Emberger's pluviothermal quotient (Q), given by the equation

$$Q = \frac{100\ P}{2\left[\frac{M+m}{2}(M-m)\right]}$$

where M = the mean of the warmest month's maximum daily temperatures, m = the mean of the coldest month's minimum daily temperatures, and P = mean annual precipitation. It is stated that the best expression of the degree of humidity of the Swedish climate is given by the difference between the mean annual precipitation and the mean annual evaporation, i.e., the run-off. Data taken from determinations of the run-off from a number of river catchment areas in Sweden (not in the high mountain regions) are shown to have a linear relation to the annual mean temperatures of the areas in question. An equation is given for deriving the mean annual evaporation from the mean annual temperature. The equation, derived from data from 25 river catchment areas, is as follows: A = 30·4t + 220·9, where A = mean annual evaporation in mm., and t = mean annual temperature in °C. The percentage area of open water per catchment area and the amount of annual precipitation had little effect on the validity of the equation. The type of terrain and topography in the catchment areas had a slight effect on the terms of the equation and two additional equations for different types of terrain are given. Since mean annual evaporation can be determined from temperature data, the difference between this value and that of the mean annual precipitation can be used as a reliable index of the degree of humidity of the climate; for this difference the term H-value is proposed.—P.J.B.

WEEDS, WEED CONTROL AND WEEDKILLERS

1440† GRANSTRÖM, B. **Chemical control of *Cirsium arvense* Scop. [creeping thistle].** *K. Lantbr-Högsk. Ann.* 1954, **21,** 281-5, bibl. 2.

In preliminary trials in Sweden on the control of *C. arvense*, the salts of MCPA and 2,4-D were more effective than the esters of MCPA, 2,4-D and 2,4,5-T. The Na salt of PCP, 2,4-dichlorophenoxyethyl sulphate, 2,4-dichlorophenoxyacetanilide and potassium ethyl xanthate were relatively ineffective. In 4 trials during 1949, *C. arvense* on pasture and arable land was sprayed at 5 different growth stages with 0·5 or 1 kg. per ha. of MCPA Na salt, or 2,4-D triethanolamine salt. 2,4-D was more effective than MCPA and gave the best results when applied just before the plants flowered. Data are given of the effect of the treatments on root reserves. Late treatments markedly reduced the inulin + sugar content of the roots, but resulted in slightly higher contents of protein and fat. At the start of flowering, inulin + sugar root-reserves were at a level of about 40% of those during the previous overwintering period; spraying at this time would, it was considered, largely prevent the subsequent overwintering of plants, by preventing the rebuilding of root reserves.—P.J.B.

1441 FARM CHEMICALS. **Aminotriazole as a weedkiller.** *Fm Chem.* 1955, **118,** No. 5, 58.

Observations are given on the effectiveness of amino triazole (3-amino-1,2,4-triazole) against a number of weed species. Applications of 2, 4 and 8 lb. amino triazole per ac. in 150 gal. water made

to *Cirsium arvense* plants 3-15 in. high, gave almost complete control and destruction of rhizomes to a depth of 12 in., or more. Applications at the bud stage are claimed to give complete top kill and almost complete control of regrowth. Applications of 6 and 12 lb. amino triazole per ac., disced-in under good conditions, have given 98 and 99% control of *Agropyron repens*. It is effective when applied to early spring growth, and maize can be sown on treated areas within 7-10 days. The herbicide also shows considerable promise against *Cyperus rotundus*, since it is translocated to the tubers. There is evidence that it is of value as an additive to crop desiccants.—P.J.B.

1442† Orchard, H. E. **Soldier thistle** (*Cirsium acarna* **Moench.**). *J. Dep. Agric. S. Aust.* 1955, **58,** No. 7, 286-7, illus.

Chemicals recommended for the control of this weed include ; sodium chlorate 0·5 lb. per gal. of water, arsenic pentoxide 1 lb. per 5 gal. of water, or 2 lb. 2,4-D or MCPA (0·2% solution) per acre. Spraying should be carried out when the plant is at the rosette stage.—M.P.

1443 Fischnich, O. and Pätzold, C. Entwicklungsbeeinflussung der Topinambur (*Helianthus tuberosus* L.) durch Wuchsstoffe. [**The influence of growth substances on the development of the Jerusalem artichoke.**] *Beitr. Biol. Pfl.* 1954, **30,** No. 2, 257-73, bibl. 32, illus. [Forschungsanstalt für Landwirtschaft, Braunschweig-Völkenrode, W. Germany] [Received April, 1955]

In all stages of its development *H. tuberosus* reacts to growth substances, whether these are applied to the whole plant, the tubers, or the soil. The experiments here reported were conducted chiefly with 2,4-D Na, and the reactions to concentrations of 0·0001 to 0·5% 2,4-D Na in leaves, stems, tubers and stolons at the various stages of growth from shoot to mature plant are described. With low concentrations of growth substance (less than 0·01%) young shoots showed an early and strong reaction, but recovered and grew again. With 0·1% 2,4-D Na, the usual concentration for use as a herbicide, *H. tuberosus* plants 50 cm. high were killed, but mature plants required 0·5% to kill them. The practical application of the findings is in the destruction of *H. tuberosus* in cereal fields during a rotation of Jerusalem artichoke and a cereal.—D.B.

1444 Fischnich, O. and Pätzold, C. Entwicklungsbeeinflussung der Topinambur (*Helianthus tuberosus* L.) durch Maleinsäurehydrazid. [**The influence of maleic hydrazide on the development of the Jerusalem artichoke.**] *Beitr. Biol. Pfl.* 1954, **30,** No. 3, 327-42, bibl. 15, illus. [Forschungsanstalt für Landwirtschaft, Braunschweig-Völkenrode, W. Germany] [Received April, 1955]

Results of 3-year trials in which tops and tubers of *Helianthus tuberosus* were treated with maleic hydrazide (MH) at concentrations between 0·001 and 0·8% are reported. The reactions at different stages of growth and with different concentrations of MH are described. At all stages of development at which MH was applied, growth was inhibited. Besides the morphological changes in the aerial parts, there were modifications in stolons, tubers and roots which have not been established hitherto. The inhibition to germination of tubers, induced by MH, makes this substance a suitable one for treating *H. tuberosus* tubers for food ; it would not be suitable for tubers stored for " seed."—D.B.

1445 Riepma Kzn, P. and Sijtsma, R. De bestrijding van eenjarige grasachtige onkruiden in akkerbouwgewassen. [**Control of some annual grass-like weeds in field crops.**] *LandbVoorl.* 1955, **12,** No. 5, 245-50, bibl. 6, illus. [Cent. Inst. Agric. Res., Wageningen]

Attempts to control *Alopecurus myosuroides, Avena fatua, Apera spica-venti, Poa annua* and other weeds in various field crops, are described. TCA, at 20 kg. per ha. gives good control of *A. myosuroides* without causing heavy damage to oil-seed rape. The least reduction in the yield of rape seed (0-10%) was caused when TCA was applied in March ; application of the herbicide in October caused a reduction, in one case, of about 30% in the seed yield. IPC (7·5 kg. active material per ha.) gave control of *A. fatua* in peas ; applied during a damp spring, IPC caused a yield reduction in peas of about 300 kg. per ha., but applied during a dry spring it caused no reduction in the pea yield. IPC applied at 5 or 7·5 kg. per ha. caused no reduction in bean [*Vicia faba*] yields. The use of TCA in pea crops caused a marked reduction in yields. *A. myosuroides, A. fatua* and *P. annua* in second-year lucerne were well controlled by 20 kg. TCA per ha. applied after winter ; IPC, which was less effective than TCA against the weeds, damaged the lucerne. Both DNOC and calcium cyanamide gave control of *A. spica-venti* in rye. The results of an experiment are given in which the yields of grain from weed-infested winter rye were consistently increased, in the period 1947-50, by the application of DNOC. Costs are discussed. It is doubted whether IPC can economically be applied to the bean crop.—W.J.B.

1446† Levi, E. **The inhibition of the growth of perennial grasses by maleic hydrazide.** *Aust. J. agric. Res.* 1955, **6,** No. 3, 378-87, bibl. 17, illus. [Div. Pl. Industr., C.S.I.R.O., Irrig. Res. Sta., Griffith, N.S.W.]

Growth of *Paspalum dilatatum, P. distichum, Sorghum halepense* and *Phragmites communis* was

inhibited by spring- and autumn-applications of the diethanalamine salt of MH at concentrations of 0·4, 0·8 and 1·6% active material per ac. A concentration of 0·2% was found to stimulate the growth of *P. dilatatum* and *S. halepense*. The duration of the inhibition varied with the species, and, at the same concentration, was longer after autumn- than after spring-applications. In field trials, growth of *P. dilatatum* was inhibited for 2·5 months with 0·4% MH and for 5 months with 1·6% MH, the number of inflorescences being very much fewer on treated than on control plots.—M.P.

1447† KASASIAN, L. **Weed control on agricultural land.** *Trans. Yorks. agric. Soc.* 1955, No. 106, 11-17. [A.R.C. Unit Exp. Agron., Univ. Oxford]

A review is given of recommendations current in Britain for weed control in different field and forage crops and for the control of a number of specific weeds.—P.J.B.

1448† DETROUX, L. Renseignements techniques sur l'emploi des herbicides dans nos principales plantes cultivées. [**Technical information on the use of herbicides in our most important cultivated plants.**] *Rev. Agric., Brux.* 1955, **8,** No. 2, 157-69, bibl. 14. [Sta. Phytopharmacie de l'Etat, Gembloux, Belgium]

Technical information is given on the use of the most appropriate herbicides for the following crops (among others): winter cereals (wheat, barley, rye), spring cereals (wheat, barley, oats), maize, flax, [sugar-] beet, peas, beans, clovers (red, white and crimson) and lucerne.—D.B.

1449 KOCH, F. Die Auswirkungen der anormalen Trockenheit des Sommers 1952 auf die Ackerunkrautgemeinschaften deutscher Dauerdüngungsversuche. [**The effect of the abnormally dry spell during the summer of 1952 on the weed associations of arable land undergoing long-term manurial trials in Germany.**] *Z. Pflbau* 1955, **6,** No. 1, 32-40, bibl. 9. [Landw. Hochschule, Stuttgart-Hohenheim, W. Germany]

Only in the south of Germany, which suffered most severely from the drought, was there a marked change in the weed flora; the lighter the soil, the greater was the transformation. The change, a reduction in the total number of species, was brought about by the failure to germinate or the death of the seeded weed species while the perennial ones, with means of vegetative reproduction, were better able to grow under the reduced competition. Tabulated data are presented of species present, their abundance, type of reproduction and the "water-economy number" according to Ellenberg.—D.B.

1450 SONNEMA, M. and MOOI, H. Eindverslag van het onderzoek naar de verandering der akkeronkruidvegetatie in de loop van het seizoen (Project 218). [**Final report on research on changes in arable weed populations in the course of the season.**] *Gestencilde Med. 12. Cent. Inst. agric. Res., Wageningen* 1954, pp. 12.

A report is made on weed populations, at various dates from March to October 1953, in arable fields in the Netherlands cropped with rye, spring barley, and sugar-beet. The combined frequency and rank method (modified) of de Vries was used. Tables show, for each weed noted, the following data: (a) percentage frequency, (b) percentage dominance frequency, (c) percentage importance frequency ("importance frequency" indicates the frequency with which a given weed is observed to make an important contribution, by estimated weight, to the plant population in the quadrats).—W.J.B.

1451 EDWARD, J. C. and SRIVASTAVA, R. N. **Weeds of the Allahabad Agricultural Institute Campus. 2. Rabi season.** *Allahabad Fmr* 1954, **28,** No. 4, 115-23. [Biol. Dep., Agric. Inst., Allahabad]

[See also Abs. 1043.]

1452† KELSEY, J. M. **Ragwort seed-fly establishment in New Zealand.** *N.Z. J. Sci. Technol. Sect. A.* 1955, **36,** No. 6, 605-7, bibl. 1. [Ent. Res. Sta., Dep. Sci. Industr. Res., Ashburton]

This paper is a record of establishment of the ragwort seed-fly (*Hylemyia seneciella*) in one locality in New Zealand, and shows how a beneficial insect sometimes may be successfully established from unpromising material.—From author's introduction.

1453† VOGT, E. Ein Beitrag zur Keimfähigkeit der Samen der Hühnerhirse und des Ampfer-Knöterichs, besonders ihrer im Boden ruhenden Samen. [**A contribution to the study of viability of seed of *Panicum crus-galli* var. *brevisetum* and *Polygonum lapathifolium*, especially their buried seed.**] *Angew. Bot.* 1955, **29,** No. 1, 26-32, illus. [Schlüsselburg/Weser, W. Germany]

Seeds of *P. crus-galli* from layers of soil between 30 and 100 cm. deep lost very little of their viability after a period of 30 months under ground. This was explained as a shock effect due to a long spell with soil temperatures of 0-5°C. at this depth. In the case of *P. lapathifolium* the highest viability was obtained in seed from a soil depth of 30 cm.—D.B.

1454 WATSON, R. D. **Galls similar to crown gall and nematode injury produced by 2,4-D.** *Pl. Dis. Reptr* 1955, **39,** No. 5, 391-4, bibl. 3, illus. [Idaho Agric. Exp. Sta., Moscow]

A note is given on the production of root galls in carrots, *Beta* spp. and *Brassica* spp. Concentrations of 5-10 ppm. 2,4-D applied as simulated irrigation treatments, produced root galls in these species, without producing foliar symptoms of 2,4-D damage. These findings are discussed in relation to the production of root galls in plants treated with irrigation water contaminated by 2,4-D.—P.J.B.

1455 KREWSON, C. F. and others. **Synthetic plant-growth modifiers. 4. 2-methyl-4-chlorophenoxyacetyl derivatives of amino acids.** *Weeds* 1954, **3,** No. 1, 28-37, bibl. 11. [East. Util. Res. Br., Agric. Res. Serv., U.S. Dep. Agric., Philadelphia 18, Pa.]

1456 ÅBERG, E. **Different isomers of phenoxyacetic acids and phenols—their effect and value as weed killers.** *K. LantbruksHögsk. Ann.* 1954, **21,** 312-60, bibl. 9, illus.

Data are given of the effect of different isomers of phenoxyacetic acids, chlorinated phenoxyacetic acids and phenols on a number of weed and crop species, including barley, flax and linseed. The findings are discussed in relation to their bearing on the formulation and standardization of commercial herbicidal preparations in Sweden.—P.J.B.

1457 DAVIES, F. L. and SELMAN, F. L. **Effects of water upon the movement of dinitro weed killers in soils.** *Weeds* 1954, **3,** No. 1, 11-20, bibl. 5. [Alabama Polytechnic Inst. Agric. Exp. Sta.]

Studies are reported on the movement of different formulations of DNOSBP in three soil types following leaching by water at different rates. The oil-soluble, water-miscible formulations used moved much less in the soils than did water-soluble formulations and were thought to be more effective as herbicides, particularly where heavy rainfall occurs before germination of the crop seed.—P.J.B.

1458† MUZIK, T. J. and others. **Studies on the absorption, translocation, and action of CMU.** *Bot. Gaz.* 1954, **116,** No. 1, 65-73, bibl. 11, illus. [Fed. Exp. Sta., Mayaguez, Puerto Rico] [Received May, 1955]

3-(*p*-chlorophenyl)-1,1-dimethylurea [CMU], which was used as an 80% wettable powder, reacted differently from 2,4-D. It was less selective, slower in action, and it caused no cell proliferation. Experiments were conducted on a wide variety of species to study the mode of entry and translocation of CMU in plants. A thick cuticle prevented the entry of this herbicide into the leaf but the presence of stomata appeared to be unimportant. Field spraying of leaves would not, therefore, be an effective means of controlling weeds with CMU. Experiments are described which demonstrated that : (a) CMU entered through the stem and was translocated through the xylem towards the shoot apex ; (b) plant injury was less severe under conditions unfavourable to transpiration ; (c) entry and translocation were very rapid in the root; and (d) the path of translocation in the root was through the xylem and transpiration stream towards the shoot apex. Since excised roots were grown successfully in a culture medium containing CMU, the toxic action of CMU must be confined to the aerial parts of the plant.—D.B.

1459 FANG, S. C. and others. **Herbicide action. Absorption, translocation, and metabolism of radioactive 3-(*p*-chlorophenyl)-1,1-dimethylurea (CMU) by bean plants.** *J. agric. fd Chem.* 1955, **3,** No. 5, 400-2, bibl. 7. [Oregon Agric. Exp. Sta., Corvallis]

A study is reported of the absorption and translocation of carbonyl C^{14}-labelled CMU by *Phaseolus vulgaris* plants. CMU applied to one portion of a leaf was rapidly translocated to all other parts of the same leaf, but translocation to the rest of the plant was slow. Two major compounds containing C^{14} were found in 80% ethyl alcohol extracts of the leaves of treated plants. One compound was identified as unchanged CMU and the other as an unknown radioactive CMU complex. The concentration of CMU in the leaves decreased with time, while the content of the CMU complex increased.—From authors' summary.

1460 HILL, G. D. and others. **The fate of substituted urea herbicides in agricultural soils.** *Agron. J.* 1955, **47,** No. 2, 93-104, bibl. 4. [Grasselli Chem. Dep. Exp. Sta., E.I. du Pont de Nemours and Co., Inc., Wilmington, Del.]

A report is given of studies on the rate of disappearance of 3-(*p*-chlorophenyl)-1-1-dimethylurea [CMU] and 3-(3,4-dichlorophenyl)-1-diphenylurea from soil under field conditions at 4 locations in the south-eastern States of the USA. Blanket applications of 1-2 lb. of these herbicides per ac. disappeared after 4-8 months. The results are given of laboratory experiments on the relative importance of different factors, including leaching, volatilization, chemical decomposition and microbiological degradation, concerned in the disappearance of these herbicides from soil. Microbiological degradation appeared to be the major factor responsible.—P.J.B.

1461 OVERBEEK, J. and BLONDEAU, R. **Mode of action of phytotoxic oils.** *Weeds* 1954, **3,** No. 1, 55-65, bibl. 24. [Shell Agric. Lab. Modesto, Calif.]

Aspects discussed include the penetration of phytotoxic oils into plants, the action of oils on plant cells and theories on the action of oils.—P.J.B.

1462 TILEMANS, E. M. Développements récents des herbicides. [**Recent developments in herbicides.**] *Rev. Agric., Brux.* 1955, **8,** No. 2, 119-37, bibl. 16. [Sta. Phytopharmacie de l'État, Gembloux, Belgium]

Definitions are given of technical terms used in connexion with herbicides and their application. An account is given of each herbicide in common use ; it includes the chemical formula, physical and chemical properties, its action on the plant and recommendations for use. Brief notes are given on NIX, KEX, SES, SESIN, DCU and Alanap 1 which are promising new herbicides under trial and not yet recorded in Belgian literature.—D.B.

1463† HENERIT, J. Les possibilités de mélange des herbicides et autres produits chimiques agricoles. [**The possibilities of mixing herbicides with other agricultural chemicals.**] *Rev. Agric., Brux.* 1955, **8,** No. 2, 144-56, bibl. 5. [Sta. Phytopharmacie de l'État, Gembloux, Belgium]

1464 ERICKSON, L. C. and BRANNAMAN, B. L. **Chromotropic acid method for determining 2,4-D residues in rinses.** *Hilgardia* 1954, **23,** No. 7, 175-84, bibl. 13. [Univ. California Citrus Exp. Sta., Riverside]

1465 MARQUARDT, R. P. and LUCE, E. N. **Determination of 2,4-dichlorophenoxyacetic acid (2,4-D) in grain and seed.** *J. agric. fd Chem.* 1955, **3,** No. 1, 51-3, bibl. 4. [Dow Chem. Co., Midland, Mich.]

1466† AUSTRALIAN WEED CONTROL CONFERENCE. **Proceedings of the first meeting held at Roseworthy Agricultural College, South Australia, August, 1954.** pp. 280 approx. [Melbourne]

CROP BOTANY

1467† ROLL-HANSEN, J. **Definition of the terms cultivar and strain.** *Acta agric. scand.* 1954, **4,** No. 2, 237-8. [Kvithamar State Exp. Sta., Stjørdal, Norway]

The term cultivar is defined as : (a) a clone, or several apparently identical clones, (b) a strain or strains coming within the range of characteristics of the cultivar, and (c) one (or more than one) line-hybrid coming within the range of characteristics of the cultivar. A strain within a cultivar is defined as : (a) one or more pure lines in self-pollinating plants, and (b) one or more families in cross-pollinating plants. [See also *Fld Crop Abstr.* 7 : 685, 686.]—P.J.B.

1468† DONY, J. G. **Plant notes.** *Proc. bot. Soc. Brit. Isles* 1955, **1,** Pt. 3, 320-4, bibl. 1.

The notes include information on the taxonomic features, relationships and distribution of the following species : *Hordeum leporinum, H. glaucum* and *H. pusillum* var. *pubens*.—D.B.

1469† HAUMAN, L. Contribution à l'étude des Papilionaceae-Phaseoleae du Congo Belge et du Ruanda-Urundi. [**Contribution to the study of the Papilionaceae-Phaseoleae of the Belgian Congo and of Ruanda-Urundi.**] *Bull. Jard. bot. Brux.* 1955, **25,** No. 1, 93-125. [Jardin Botanique de l'État, Bruxelles, Belgium]

New species, varieties and combinations are recorded and described within the following genera : *Glycine, Teramnus, Mucuna, Rhynchosia, Eriosema, Eminia, Moghania* and *Pseudoeriosema,* the last one being a new genus.—D.B.

1470 HALL, N. and JOHNSTON, R. D. **Field identification of dicotyledons : a punched card system for the identification of families.** *Aust. J. Bot.* 1955, **3,** No. 1, 82-8, bibl. 12, illus. [Forestry and Timber Bureau, Canberra, A.C.T.]

A punched card key for use in the identification of dicotyledons to a family level is described. It has advantages over the ordinary dichotomous key in that it allows early use of the most conspicuous or most selective characters of an unknown plant. It also facilitates the identification of incomplete material. The key is based on Hutchinson's (1926) descriptions. Cards for his 264 families have been prepared. A sample card shows the characters used and the method of clipping, and an illustration of the card set shows the distribution of various characters between families.—Authors' summary.

1471† PHILIPS, J. **Ecology in the service of man in British territories in Africa : selected aspects and examples.** *Vegetatio, Haag* 1954, **5-6,** 72-82, bibl. 119. [Univ. Coll., Achimote, Gold Coast]

Notes are presented on ecological work carried out in the last 40 years in territories controlled or influenced by the British Government. Among the subjects considered are : ecological land-use surveys in relation to development and replanning ; the contribution of ecology to pasture research and management ; ecological contributions to crop production and the development of new regions ; ecological contribution to animal husbandry. An ample bibliography is appended.—W.J.B.

472 KREYGER, J. Het bepalen van de temperatuurgevoeligheid van een negental zaaizaden door middel van verhittingsproeven. [**The determination, by means of heating tests, of the sensitivity to temperature-changes of the seed of 9 crops.**] *Publ. 44. Droogtechn. Lab., Cent. Inst. agric. Res., Wageningen* [n.d.], illus. [Received Dec., 1954]

Seeds of rape, sugar-beet, oats, rye, maize, peas, beans [*Vicia faba*], lupins and perennial ryegrass, with moisture contents in equilibrium with R.H. of 50, 70 and 90, were dried at seed temperatures of 30, 40, 50, 60 and 70°C. for periods varying from 0 to 240 minutes. The effects on germinative capacity are tabulated and illustrated by graphs for the seed of each crop. There are also notes on the effect of heating processes on germinative energy, abnormal germination, and curling of roots after germination. The germinative capacity of all seed with a moisture content in equilibrium with a R.H. of 90 fell to less than 20% when dried at 70°C. At 30°C. and lower there was no loss of germinative capacity in the seeds of any crop. Rape and lupin seeds were the most resistant to heat (at moisture contents in equilibrium with R.H. 50 they showed no loss of germinative capacity when heated at 70°C.). Rye, beans and maize were the least resistant to heat. Graphs show that germinative energy and germinative capacity were similarly affected by the heating process ; the loss of germinative energy tended to be more pronounced than that of germinative capacity.—W.J.B.

1473† PASQUINI, D. Ricerche intorno all'influenza dell'aria compressa sulla germinazione dei semi di alcune piante coltivate. [**Investigations on the influence of compressed air on the germination of seeds of some cultivated plants.**] *Ann. Sper. agr.* 1955, **9,** No. 3, 683-708, bibl. 83, illus., English summary pp. 703-4. [Sta. Agr. Sper., Modena, Italy]

In the investigations described, carried out with seeds of many species including *Zea mays, Vicia sativa, Triticum vulgare, Pisum sativum, Avena sativa, Sorghum vulgare, Secale cereale, Vicia faba, Oryza sativa* and *Trifolium repens*, it was found that compression with air at 7 atm. for 12 hr. facilitated, in general, the penetration of water through the seed-coats, but that it lowered the percentage of germination and the germinating energy in some species. *Trifolium repens* was an exception, as treatment of the seeds of this species delayed the penetration of water, and increased the germinating energy and the percentage of hard seeds. With small *Vicia faba* plants, compression at 5 atm. for 7 days caused abnormalities in the growing tips which resulted in suspension of growth. The morphological and histological changes caused by compression in the growing tips of *Vicia faba* are described.—E.B.O.

1474 SENGBUSCH, R. von. Die Erhaltung der Keimfähigkeit von Samen bei tiefen Temperaturen. [**Maintaining viability of seed at low temperatures.**] *Züchter* 1955, **25,** No. 6, 168-9, bibl. 4, illus. [Max-Planck Inst. für Züchtungsforschung, Hamburg-Volksdorf, W. Germany]

A graph compares the germination capacity of hemp, rye and sugar-beet seed stored at —20°C. with that stored at +20°C. over a period of 5 years. Hemp and rye seed stored at +20°C. lose their viability after 3 years, but when stored at —20°C. they retain 90 and 98% viability, respectively, after 5 years. In the case of sugar-beet seed there is very little change in germination capacity whether seeds are stored at +20°C. or at —20°C for 5 years. Since the embryos of rye and hemp seeds were not injured by a temperature of —40°C. it is assumed that —20°C. is a safe storage temperature. Germination energy was not reduced by storage at this temperature [one year's tests]. In this low-temperature storage-method, previous seed drying or the sealing of seed in closed containers is not necessary.—D.B.

1475 WHARTON, M. J. **The use of the tetrazolium test for determining the viability of seeds of the genus *Brassica*.** *Proc. internat. Seed Test. Ass.* 1955, **20,** No. 1, 81-8, bibl. 6. [Seed Test. Sta., Palmerston North, New Zealand]

The technique found best was to place the seed in a 1% solution of 2,3,5-triphenyl tetrazolium bromide, in dishes held in the dark at 30°C. for 48 hr. The seed was then washed in tap water, the seed-coat removed by dissection and the amount and distribution of staining of the radicle and cotyledons noted. Comparisons of the results of germination and tetrazolium tests are given and showed good agreement.—P.J.B.

1476† VERHEY, C. **Germination equipment of the seed testing station at Wageningen.** *Proc. internat. Seed Test. Ass.* 1955, **20,** No. 1, 5-28, illus.

Descriptions, with illustrations, are given of the following apparatus : (a) germinator for seeds which germinate at constant temperatures in darkness, (b) Jacobsen apparatus, designed for seeds which require either constant or alternating temperatures, combined with light at the high temperature phase, (c) a dark germinator using temperatures considerably lower than 10-15°C., (d) a dark germinator for alternating temperatures, (e) a room germinator for seeds which require constant temperature and darkness for germination, and (f) a room germinator for seeds which germinate in darkness and which require alternating temperatures for their development.—P.J.B.

1477 OLEĬNIKOVA, T. V. [**The influence of environ-**

mental conditions during the seed production stage on changing the phasic characteristics of plants.] [Russian] *Doklady Akad. Nauk SSSR* (*Proc. Acad. Sci. USSR*) 1954, **99,** No. 3, 467-70, bibl. 10. [All-Union Inst. Pl. Industr.]

The author's study of varieties of winter wheat, rye and flax was designed to determine the influence of growth conditions in changing the length of the plants' vernalization phase. Seeds of the above crops from different geographical sources were vernalized at 0° and +2°C. for varying lengths of time, after which they were sown in the field with unvernalized controls. The number of days between germination and earing in the winter-wheat variety Ukrainka obtained from Eastern Germany and grown in Puškin (vernalized for 35 days) was 58 while the number of days required for earing in this variety obtained from the Harjkov Province and grown in Puškin, was 49. The material from Eastern Germany vernalized in Puškin for 25 days did not ear, while that from Harjkov vernalized for 25 days eared after 63 days. Thus the Ukrainka variety from Germany has a longer vernalization phase than has the same variety grown in Harjkov. The rye varieties Vjatka and RDS from Siberia (Omsk and Irkutsk Provinces) require less time to pass the vernalization stage than do the same varieties from northern regions (Kirov and Leningrad Provinces); for example, Vjatka from Kirov vernalized for 25 days, eared after 68 days while this variety from Omsk and Irkutsk eared after 51 and 49 days, respectively. The trials with many samples of flax grown in the north (Puškin) and in the south (Maikop, Kuban) showed that there were no great differences in regard to length of the vernalization period, with the exception of the trailing flax from Azerbaĭdžan and Asia Minor [grown mainly for fibre]. A prolonged growing of this type in northern regions lessened its vernalization reaction. For example, trailing flax from Azerbaĭdžan (2026) grown in Puškin and vernalized, flowered 4 days earlier than the control [unvernalized]. The same variety from Maikop flowered in Puškin 15 days earlier than the control. Transferring a southern trailing flax to northern conditions changed its vernalization need by making it similar to that of the northern fibre-flax. A series of tests to determine the influence of environment on the light phase of plants was made with the wheat varieties Diamant, and Finland wheat No. 19313 grown for many years, unirrigated, at the Cis-Aral Experimental Station. The data show that both these varieties grown in Puškin under short-day conditions (12 hour) eared after 95 and 83 days, respectively, while the same varieties grown at the Cis-Aral Station eared in a 12-hour day after 105 and 91 days, respectively. Thus, in these spring wheats of northern origin, the light stage is retarded when they are grown in more southerly latitudes. It is concluded that changes are effected in the phasic characteristics of plants only when the environmental conditions are abnormal for the needs of the varieties concerned.—M.H.

1478† Gill, W. R. and Bolt, G. H. **Pfeffer's studies of the root growth pressures exerted by plants.** *Agron. J.* 1955, **47,** No. 4, 166-8, illus. [Agron. Dep., Cornell Univ., Ithaca, N.Y.]

The techniques used by Pfeffer for the study of root growth pressures, as reported in the paper entitled "Druck und Arbeitsleistung durch wachsende Pflanzen", published in *Abhandlungen der Königlich Sachsischen Gesellschaft der Wissenschaften* 1893, Vol. 33, pp. 235-474, are described and illustrated. The basic principle of Pfeffer's technique involves encasing a portion of the root in a plaster of Paris block, to provide a base against which the growing root can exert pressure against a second block. Pfeffer's conclusions on pressure measurements, the mechanism of pressure development and the exterior work performed by growing plants are discussed and amplified by the results of studies by the present authors.—P.J.B.

1479 Henkelj, P. A. and Cvetkova, I. V. [**Increase of the plant's resistance to heat.**] [Russian] *Doklady Akad. Nauk SSSR* (*Proc. Acad. Sci. USSR*) 1955, **102,** No. 2, 383-6, bibl. 5. [Timirjazev Inst. Pl. Physiol., Acad. Sci. USSR]

The work of Holodnyĭ [*Biochem. Z.* 1924, No. 1/2, and *Protoplasma* 1933, Vol. 20, No. 1] demonstrated that under the influence of mono- and divalent cations (particularly hypotonic solutions of potassium chloride and calcium chloride), protoplasm changes its character; for example, the hypotonic solution of monovalent cations lowers the viscosity of protoplasm, while a solution of divalent cations increases it. The connexion between protoplasm viscosity and the capacity of plants to tolerate high temperatures has been observed [see *Fld Crop Abstr.* 5 : 277, 588, 1070; *ibid.* 2 : 1442; and *Herb. Abstr.* 20 : 938]. Calcium chloride increases the viscosity of protoplasm and thereby the plant's tolerance of heat, while potassium chloride lowers such viscosity and heat toleration. The authors' work is designed to study by means of seed treatment the effect on the plant's resistance to heat of calcium chloride. Seeds of millet and wheat were submerged in a 1/40 *M* solution of calcium chloride as follows: proso millet var. Kremovyi for 18 hr. and Lutescens 605 wheat for 24 hr. [seed and solution quantities not given] without subsequent rinsing in water. The seed was then partly dried and sown in the field [sowing rate not stated]. The test was made on chestnut solonetz soils under irrigated conditions

at the Kostyčev Valuevsk Experimental Station, where the climate is that of the southern steppe, with a high soil- and air-temperature in summer [data not given]. The method of determining the resistance to heat of the plants grown from treated seed was as follows : cut sections of the leaf's upper epidermis were coloured by immersion in neutral red (1 : 10,000) and then placed in a solution of sodium chloride for several hours (15 or 20). The sections were then studied under a microscope. The presence of a significant number of living cells in the visual field is taken as an indication of the plant's high salt tolerance. Protoplasmic viscosity was determined by the plasmolytic method and heat tolerance determined by the protein coagulation method. There is evidence that treating seed of millet and wheat with a solution of calcium chloride not only improves resistance of the subsequent plants to heat, but growth, development and yields are also enhanced. For example, heat tolerance of millet was increased from 57° to 59°C. and viscosity of the protoplasm from 60 to 80 min. The % of living cells (after 15 hr. in a solution of NaCl) increased from 28 (control) to 45. Data for wheat were similar. Grain yield increased by 31% in both millet and wheat. From tests made during 1951-3 with the first and second generations of the plants from treated seed there is an indication that adaptation to high temperatures and other physiological characters are inherited features of the plants.—M.H.

1480 GROBBELAAR, N. **Growth and nitrogen metabolism of certain legumes, with special reference to the effects of controlled environments.** *Diss. Abstr.* 1955, **15,** No. 6, 962.

In this thesis, the discovery and chemical characteristics of the amino acids and proteins of plants is reviewed and a procedure for the large-scale isolation of L-pipecolic acid is described. The literature on the changes occurring in the nitrogenous metabolism and composition of plants is also reviewed, with particular reference to recent work with *Pisum sativum* in South Africa. Data on the effect of light and temperature conditions on the growth and N composition of 4 pea varieties are given.—P.J.B.

1481 SLATYER, R. O. **Studies of the water relations of crop plants grown under natural rainfall in Northern Australia.** *Aust. J. agric. Res.* 1955, **6,** No. 3, 365-77, bibl. 15, illus. [Land Res. and Reg. Surv. Sect., C.S.I.R.O., Canberra, A.C.T.]

Studies of the water relations of cotton, groundnuts and grain sorghum were made at Katherine, N.T., on crops grown under natural rainfall during the 1952-3 rainfall season. In the early part of the season, rainfall was normal ; the latter part, however, was abnormally dry and resulted in the appearance of severe water-stress symptoms in all crops. The water balance of the plants was followed throughout the season by the "relative turgidity" technique of leaf turgor measurement. In each crop the relative turgidity level was maintained at a fairly high level until the onset of dry conditions, when a progressive decline began. Of the 3 crops, sorghum appeared to have the best-developed root system and also the most effective internal control over transpiration. Cotton appeared to be least well equipped in these respects. The relative resistance to turgor loss was in turn reflected in growth rate reductions in cotton as soon as soil moisture stress appeared, but not in sorghum until severe soil moisture stress was evident. The groundnut responses throughout appeared intermediate between those of the other two crops. —From author's summary.

1482† NAGANNA, B. and others. **Occurrence of alkaline pyrophosphatase in vegetable tissues.** *Biochem. J.* 1955, **50,** No. 2, 224-5, bibl. 2. [Dep. Chem., Madras Vet. Coll., Madras 7, India]

Plant tissues analysed included those of rice, wheat, *Eleusine coracana, Vigna catjang, Dolichos lablab, Phaseolus* spp. and grass [unspecified].—M.P.

1483 BROWN, D. A. and NOGGLE, J. C. **Ion exchange in soil-plant root environments : 1. Measurement of suites of cations at various stages of nutrient uptake.** *Proc. Amer. Soc. Soil Sci.* 1955, **19,** No. 2, 131-9, bibl. 5. [Univ. Arkansas, Fayetteville]

1484† NOBLE, W. M. **Air pollution effects. Pattern of damage produced on vegetation by smog.** *J. agric. fd Chem.* 1955, **3,** No. 4, 330-2, bibl. 15. [Los Angeles County Air Pollution Control District, Calif.]

Smog damage to plants in the Los Angeles region is discussed, with particular reference to the phenomenon of leaf banding. The location of smog damage in bands on leaves appeared to be related to the cellular maturity of the affected parts and to be confined to that part where cellular differentiation had most recently been completed. Typical smog damage was caused by hydrocarbons from petrol vapour and by car-exhaust vapours in the presence of ozone. The use of artificially-simulated smog damage was thought to have a possible use in the study of the growth and development of plants.—P.J.B.

1485 FRANSSON, P. and INGESTAD, T. **The effect of an antiauxin on the indoleacetic acid content of *Avena* coleoptiles.** *Physiol. Plant.* 1955, **8,** No. 2, 336-42, bibl. 5, illus. [Bot. Lab., Lund, Sweden]

1486 ADDICOTT, F. T. and others. **Auxin gradient theory of abscission regulation.** *Science* 1955, **121,** No. 3148, 644-5, bibl. 19. [Bot. Dep., Univ. Calif., Los Angeles]

The following theory is proposed for the regulation of abscission in plants : auxin is the principal endogenous regulator of abscission, and the gradient of its concentration across the abscission zone regulates the rate and onset of abscission. Where auxin concentrations are high distal to, and low proximal to, the abscission zone, abscission does not take place. Where this ratio is decreased abscission occurs, and where it is reversed abscission is accelerated. Several factors supporting this theory are quoted.—P.J.B.

1487 ÅBERG, B. **Studies on plant growth regulators. 10. On the reproducibility of root growth results.** *K. LantbruksHögsk. Ann.* 1954, **21,** 197-211, bibl. 28.

A statistical analysis is made of the variability of the data obtained in solution tests of the reaction of flax roots to different plant growth regulators, including 2,4-D. The results of the flax root tests are compared with those obtained from cress-, tomato-, wheat- and pea-root tests.—P.J.B.

1488 ÅBERG, B. and JÖNSSON, E. **Studies on plant growth regulators. 11. Experiments with pea roots, including some observations on the destruction of indoleacetic acid by different types of roots.** *K. LantbruksHögsk. Ann.* 1954, **21,** 401-16, bibl. 15.

The studies reported relate to the effect on intact pea seedling roots and root sections of 3-indolylacetic acid, 2,4-D, alpha-(1-naphthylmethylsulphide)-propionic acid and 2,3,5-tri-iodobenzoic acid.—P.J.B.

1489 HOWELL, R. W. and SKOOG, F. **Effect of adenine and other substances on growth of excised *Pisum* epicotyls cultured *in vitro*.** *Amer. J. Bot.* 1955, **42,** No. 4, 356-60, bibl. 23, illus. [U.S. Reg. Soybean Lab., Urbana, Illinois and Univ. Wisconsin, Madison]

In an investigation of factors required for shoot growth, tests were made of the effects of various substances and natural products which promote the growth of *Pisum* epicotyls *in vitro*. Adenine sulphate exerts a marked growth-promoting effect. Not only does it reverse the inhibitory effect of indoleacetic acid (IAA), but its stimulatory effect is enhanced by the presence of IAA. Apparently both substances are required, and the proportions of the two may determine the growth rate. The adenine effect is much reduced in epicotyls cultured in the dark, but inclusion of cobalt with adenine in the medium restores the stimulation to about the level obtained with adenine alone in the light. One or more active substances in addition to IAA or adenine are present in fresh coconut milk. These not only stimulate elongation but promote the development of excised epicotyls to an extent approaching the normal development of shoots from intact seeds. Coconut milk and adenine when used together gave a greater stimulation than either gave alone. Growth stimulation from added adenine or coconut milk required the presence of roots, the formation of which, however, was not promoted by adenine. The results obtained support the hypothesis that a specific factor is synthesized in the roots. The effect of adenine is apparently related to this material.—Authors' summary.

1490† BORROW, A. and others. **Gibberellic acid, a metabolic product of the fungus *Gibberella fujikuroi* : some observations on its production and isolation.** *J. Sci. Fd Agric.* 1955, **6,** No. 6, 340-8, bibl. 26, illus. [I.C.I. Akers Res. Lab., Welwyn, Herts]

This plant-growth-promoting substance was shown to be produced by several strains of *Gibberella fuijikuroi*, 9 isolated from rice plants and one from sugar-cane. [See also Abs. 1103.]—M.P.

1491† COOPER, H. P. and HALL, E. E. **Differential in potential production and in utilization of nitrogen and potassium by calcium-accumulating and silicon-accumulating crop plants.** *Soil Sci.* 1955, **79,** No. 6, 441-58, bibl. 24. [S. Carolina Agric. Exp. Sta., Clemson]

1492† GRAY, B. C. **Some factors influencing calcium-boron ratios in plants.** *Diss. Abstr.* 1955, **15,** No. 6, 927-8. [Ohio State Univ.]

Studies are reported on the effect of root cation exchange capacity, available Al, Mn and H and source of boron on the Ca : B ratio in different parts of a number of crop species.—P.J.B.

1493† MAZOYER, M. Role du sodium en agriculture. [**The role of sodium in agriculture.**] *Industr. chim., Paris* 1954, April, pp. 11, bibl. 27.

A resumé of the subject is given under the following heads : the presence of Na in plants ; assimilation of Na by cultivated plants ; influence of Na on growth and yield of cultivated plants, including sugar-beet, barley, cotton, wheat, ryegrass, lucerne and flax.—D.B.

1494† SCHELTINGA, A. Lood in grond, plant en dier. [**Lead in soils, plants and animals.**] *Landbouwk. Tijdschr., Wageningen* 1955, **67,** No. 3, 153-64, bibl. 25, English summary p. 163.

The lead content of 20 Dutch soils and of certain fertilizers containing small quantities of lead was determined. It was concluded that the application

of these fertilizers to the soils tested could cause no damage to plants or animals.—W.J.B.

1495† KATALYMOV, M. V. and ŠIRŠOV, A. A. [**Content of cobalt in plants, soils and fertilizers.**] [Russian] *Doklady Akad. Nauk SSSR (Proc. Acad. Sci. USSR)* 1955, **101,** No. 5, 955-7. [Ja. V. Samoĭlov Sci. Inst. Fertilizers and Insecto-Fungicides]

Because of the importance of cobalt in stock nutrition and the paucity of information on this subject in the USSR, the authors have investigated the content of this element in: (1) different plants grown under uniform conditions; (2) fifteen different samples of soil from the tilled layer in various Provinces; and (3) most of the main kinds of fertilizers used in agriculture. Cobalt was determined in the plants by the colorimetric method using nitroso-R-salts (1-nitroso-2-naphthol-3,6-sodium-disulphonate). The plants (wheat, oats, barley, millet, beans, lucerne, vetch, sainfoin, sugar-beet and fodder-beet) were grown on 20 m.-sq. plots of weakly-leached black-earth from the Harjkov Province supplied with 45 kg. N, P_2O_5 and K_2O per hectare. The plants were harvested at the stage of full ripeness and after calculation of yields they were analysed for cobalt. The data show that cobalt content of the plants fluctuates between 0·22 and 0·58 mg./kg. dry weight; the highest cobalt contents were in the leguminous herbage (0·52 in sainfoin hay), stalks of the beans (0·58) and beet leaves (0·49). The cobalt content of the total harvests varied between 0·8 and 2·3 g./ha. The Co content of the soils varied between 1·7 and 5·4 mg. per 1 kg. soil. It is concluded that attention should be directed to the Co content of plants which are grown on red earth, sandy and peaty soils, as these contain the least amount of cobalt. Of the fertilizers analysed, the greatest amount of Co is in pyrite cinders (145 mg./kg.), the least is in farmyard manure (1·35 mg./kg.), while NK mineral fertilizers and superphosphate from apatite contained no cobalt.—M.H.

1496† ANDRUS, S. **Determination of copper in plant materials by means of zinc dibenzyldithiocarbamate.** *Analyst* 1955, **80,** No. 952, 514-16, bibl. 5. [N.A.A.S., Trawscoed, Aberystwyth, Wales]

The method described is for the rapid absorptiometric determination of copper in plant materials over the range nil to 15 ppm. The method is free from interference by other metals in plant material. —P.J.B.

1497† SHOJI, K. and NAKATA, S. **The rapid determination of potassium, calcium and magnesium in plant material by hydrogen flame spectrophotometry.** *Proc. Amer. Soc. hort. Sci.* 1954, **64,** 299-306, bibl. 6. [Hawaii Agric. Exp. Sta., Honolulu]

MISCELLANEOUS

1498† DEPARTMENT OF PUBLIC ADMINISTRATION, AGRICULTURAL SECTION, SWITZERLAND. Schlussbericht der Eidg. Kommission zum Studium der Hagelbildung und der Hagelabwehr über den Grossversuch Nr. I zur Bekämpfung des Hagels auf der Magadinoebene (Tessin) 1948 bis 1952. [**Final report, by the Swiss Federal Commission for the study of hail formation and its prevention, on the first large-scale experiment for control of hail on the Magadino Plain (Tessin) 1948-52.**] *Landw. Jahrb. Schweiz* 1955, **69,** No. 3, 269-90, illus.

The organization of the experiment is described and the results of rocket firing (so far unsuccessful) are discussed.—D.B.

1499† DORPH-PETERSEN, K. Magnesiumproblemet for landbrugets planteavl. En oversigt over det nuvaerende standpunkt i forsøg og forskning. [**The magnesium problem in the cultivation of agricultural crops. A review of the present standpoint in research and investigation (in Denmark).**] *Tidsskr. Planteavl* 1955, **58,** No. 3, 369-95, bibl. 30.

1500 THORUP, S. and others. Sprøjtning med kemiske midler til fremme af modningen. [**Spraying with chemicals to hasten crop maturation.**] *Tidsskr. Landøkon.* 1954, No. 7, 329-53, illus., English summary 352-3.

The results are given of preliminary pot trials and field trials at two locations in Denmark, on the use of desiccants for treating different seed crops, including wheat, barley, oats, winter rape, mustard and maize. The desiccants used included calcium chloride, sodium trichloracetate (TCA) and DNOSBP in water, oil + water, or oil emulsions. In the field trials, the chemicals were applied both from tractors and from the air. In field trials with barley, desiccant treatments caused no significant decreases in moisture content. In wheat, moisture content decreases were obtained, but only at the price of a corresponding decrease in grain weights. Treatment of barley and wheat with DNOSBP oil emulsions resulted in a reduction of germinating

capacity of the seed. The use of defoliants on cereal crops was not considered a practical proposition, except in special cases, such as uneven ripening of the crop, weed infestation, or the need to reduce over-luxuriant stands of undersown legumes. In both winter rape and mustard, desiccant treatments resulted in marked reduction in moisture content. In winter rape, the stems dried out much less quickly than the seed pods, which resulted in a considerable risk of seed shattering before combine harvesting could be started. The germinating capacity of both mustard and winter rape was reduced considerably by DNOSBP oil emulsion treatments ; with the oil seed crops, TCA was relatively ineffective as a crop-drying agent, compared with the other treatments. Amounts of 6·25, 12·5 and 25 kg. active chemical per ha. used in these trials had very similar effects on cereal crops and differed only slightly more in their effects on other crops.—P.J.B.

1501† ENGLAND AND WALES Ministry of Agriculture, Fisheries and Food. **Toxic chemicals in agriculture. Risks to wild life. Report of the working party.** *Publ. England and Wales Minist. Agric. Fish. Fd* 1955, pp. 31.

1502† ROUSSEAU, J. Quelques expériences en vue de contrôler l'effet du Toxaphène sur les abeilles. [**Some experiments with the object of controlling the effect of Toxaphene on bees.**] *C.R. Acad. Agric. Fr.* 1955, **41,** No. 7, 359-6.

From experiments in which bees were fed with Toxaphene or dusted with it, at different concentrations, it was concluded that a 10% Toxaphene powder, applied normally at 25 kg. per ha. was practically harmless to bees. The findings are considered of value in cases where flowers, pollinated by bees, are sprayed or dusted with the insecticide.—M.P.

1503† ENGLAND AND WALES Ministry of Agriculture and Fisheries. **Crop protection products approval scheme. Approved list 1955.** *Publ. England and Wales Minist. Agric. Fish.* 1955, pp. 16.

1504† GÜNTHER, W. Wirkungsbreite und Grenzen der Anwendung der Estermittel im Pflanzenschutz. [**Range and limitations in the use of ester preparations in plant protection.**] *Kühn-Arch.* 1954, **68,** No. 2, 91-140, bibl. 252. [Martin-Luther-Univ. Halle-Wittenberg]

1505 DIAZ, D. Fitotoxicidad de cinco insecticidas aplicados al suelo en la germinación y primer crecimiento de cuatro cultivos. [**Effects of 5 insecticides, applied to the soil, on the germination and establishment of 4 crops.**] *Acta agron., Palmira* 1954, **4,** No. 4, 175-202, bibl. 17, illus., English summary p. 200.

The effect of 50% Dieldrin, 2·5% Aldrin, 40% Toxaphene, 7·3% BHC and 40% Chlordane, applied at various rates to the soil before sowing took place, on the germination and early growth of maize, cotton, beans [*Phaseolus* sp.] and soyabeans, was determined. All the insecticides were applied at the recommended rates, and at half, twice and four times the recommended rates. There were controls for each crop in which no insecticides were applied. Dieldrin at the recommended rate (5 kg. per ha.) caused a significant reduction in the germination of all crops. The effect was just significant in the case of maize, but marked in the case of cotton, soyabeans and beans ; at half the recommended rate, germination rates were much the same as at the recommended rate. In the case of soyabeans, germination was reduced from 41% to 27% by Dieldrin applied at the recommended rate. Aldrin at the recommended rate (2 kg. per ha.) had an effect very similar to that of Dieldrin. Toxaphene at the recommended rate (2 kg. per ha.) reduced the germination rate of soyabeans from 39 to 28% but did not affect the germination of the other crops. At twice the recommended rate, it reduced the germination of cotton and soyabeans. BHC at the recommended rate, 0·78 kg. per ha., did not affect the germination of the 4 crops. The germination of cotton and soyabeans, but not of maize and beans, was significantly reduced by Chlordane at the recommended rate (2 kg. per ha.). Chlordane at twice the recommended rate caused a marked reduction (compared with the recommended rate) in the germination of soyabeans. The early growth of maize was not affected by any of the insecticides. No insecticide had a permanent effect on the growth of soyabeans, although morphological changes were noted during the early stages of growth after applications of Aldrin and Chlordane at all rates. Of the insecticides applied, only Dieldrin, at rates of application above those recommended, had any adverse effect on the early growth of cotton. The early growth of beans was adversely affected by Dieldrin and Aldrin at all rates.—W.J.B.

1506† NEWHALL, A. G. **Disinfestation of soil by heat, flooding and fumigation.** *Bot. Rev.* 1955, **21,** No. 4, 189-250, bibl. 386. [Cornell Univ., Ithaca, N.Y.]

1507 BEAL, J. M. **Use of 2,3,5-triphenyl tetrazolium chloride to detect the presence of viruses in plants.** *Pl. Dis. Reptr* 1955, **39,** No. 7, 558-60, bibl. 6.

Trials are reported in which TTC was used success-

fully, as a 0·5% solution, to detect the presence of virus in the tissues of a number of plant species, immersed in the solution at a temperature of 35°C. for up to 30 minutes. The colour change in the tissues was from green to rust, then amber and finally to blood-red. The test is based on a difference in the rate at which the colour changes occur in virus-infected and healthy tissue and a method is given for using a colour index to this end. The method was successfully used for testing sugar-beet and bean tissues.—P.J.B.

1508 THIELEBEIN, M. Möglichkeiten der Saatgutproduktion und Vermehrung in den best geeignetsten Gebieten der beteiligten Lander. [**Possibilities of seed production and multiplication in the most suitable areas of the participating countries.**] *Internat. Conf. Prod. Test. Distrib. Seed, Stockholm. July, 1954* pp. 13, bibl. 16. [ForschungsAnstalt für Landwirtschaft, Braunschweig, W. Germany]

1509† MCDONALD, A. N. C. **Some experiments on the mechanical extraction of leaf protein.** *Rep. 43. NIAE* 1954, pp. 30, illus. bibl. 9. [N.I.A.E., Silsoe, Bedfordshire]

Engineering equipment was tested and found suitable for the extraction on a commercial scale of a protein-rich, fibre-free product from green leaves and similar materials. Good quality crops can be processed at rates of at least 1 ton per hr. and up to 55% of the crude protein originally in the fresh crop can be extracted in the liberated juice if the crop is pressed twice and washed between pressings. Higher extraction rates are not justified until the value of the extracts and residues are established.—C.L.S.

1510 HOWARD, H. W. **The farmer's guide to agricultural research, 1954. Crops and plant breeding.** *J. roy. agric. Soc.* 1954, **115,** 126-37, bibl. 32.

The latest results in research, including weed-control, are reviewed.—W.J.B.

1511† NATIONAL INSTITUTE OF AGRICULTURAL BOTANY, CAMBRIDGE. **Guide to varieties of field and vegetable crops under trial, observation and propagation.** *Publ. NIAB* 1955, pp. 80.

REPORTS

The notes below indicate the main investigations in the reports covered, in so far as they concern this journal. Where a separate abstract has been made from a particularly interesting section of a report, this is indicated.

1512 **Great Britain.** Rothamsted Experimental Station. Report for 1954. Harpenden, 1955, pp. 242, 7s. 6d.

INVESTIGATIONS REPORTED :

1. Irrigation experiments on grass, sugar-beet, barley and potatoes. By R. K. Schofield and H. L. Penman, p. 36. The grass plots were reseeded in 1954 to S37 cocksfoot and main-crop potatoes replaced earlies. Owing to excessive rainfall in 1954, irrigation, all applied before the end of July, led, on the whole, to slight decreases in crop yields at both levels of N.

2. The effect of different methods of applying fertilizer to spring cereals. By R. K. Schofield, pp. 42-3. Although the differences were smaller than in previous years, yields of wheat and barley were increased more by combine-drilling than by broadcasting ; and by the application of super-phosphate plus nitro-chalk than by an equivalent amount of nitrophosphate. Phosphate drilled with the seed improved the establishment and early growth of the cereals.

3. The effect of different methods of fertilizer placement on the yield of potatoes. By R. K. Schofield, p. 43. Placing both N and K with the seed gave higher yields than broadcasting the dressings on the seed-bed before planting. In one experiment, placing proved better at low rates of fertilizer applications, and broadcasting when high rates were used. In 7 experiments, 1 cwt. N per ac. sufficed for maximum yields of main-crop potatoes. Mid-season top-dressing with N proved unnecessary.

4. Interaction between iron and other micro-nutrient elements in flax, soyabeans and peas. By K. Warington, pp. 64-5. The divergent effects of molybdenum on chlorosis were shown to be dependent on the form and concentration of the Mo supplied, also on the nature and age of the plants. In later growth stages, 30 ppm. iron were toxic to flax but the harmful effect was reduced by 40 ppm. Mo. The reduction of vanadium toxicity by Fe in soyabeans depended on the form and concentration of Fe used, and appeared to be mostly through an internal interaction, whereas in peas the interaction between V and Fe occurred mostly outside the plant.

5. Nutrient uptake by excised roots. By E. C. Humphries, pp. 65-6. Confirmation was obtained that the positive correlation between rate of nutrient uptake and sugar content of the roots is attributable to the reducing-sugar fraction in the roots.

6 Nutrient uptake from leaf sprays. By G. N. Thorne, pp. 66-7 and 188-93. In trials with small swede plants, it was found that the uptake of a nutrient from a leaf spray reduced the uptake of that nutrient by the roots when the supply to the roots of the nutrient concerned was high relative to other nutrients. [This was not apparent in previous years.] The amount of reduction was roughly equal to the amount taken in through the leaf surfaces. Absorption of P^{32} was greater through the lower than through the upper leaf surface ; it was translocated to other parts of the plant, including the roots, but was not excreted by the roots.

7. Germination and dormancy of wild oat seeds. By J. M. Thurston, pp. 67-9.

8. The effect of autumn- and spring-sown cereals on the weed flora. By J. M. Thurston, pp. 69-70. A comparison of the weed flora of autumn-sown barley or rye, spring-sown wheat or barley, or fallow with cultivations, showed the weed species to be affected differently by the cultivation treatments, growth and frequency varying with the crops, fallows and time of the cultivation.

9. The effect on sugar-beet of infection with beet yellows virus. By D. J. Watson and P. C. Owen, pp. 70-1.

10. The effect of time of application of nitrogenous fertilizer and of mildew infection on the yield of wheat. By G. N. Thorne and F. T. Last, p. 71. Since the development of *Erysiphe graminis* is correlated with leaf growth rate, the application of N fertilizer at different times will affect the development of the mildew at different stages of growth. Contrary to previous experience, N application at ear emergence had little effect on grain yield, though earlier applications caused large increases.

11. Plant enzymes catalysing oxidations. By R. H. Kenten, pp. 74-5. The enzymatic constitution of bracken is being studied in an effort to develop a bracken-killing agent.

12. Potato virus diseases. By L. Broadbent, p. 85. Greatest yields from mature King Edward potatoes were obtained from the earliest plantings, but leaf roll and virus Y infection were highest. Virus-free seed from August-planted crops yielded significantly less than that from earlier plantings but the percentage of healthy tubers was highest (93%). The use of persistent insecticides prevented the spread of virus diseases within a potato crop, but did not prevent their introduction from outside sources.

13. Sugar-beet virus diseases. By F. C. Bawden, pp. 87-91. [See Abs. 1311]

14. Studies in potato blight. By J. M. Hirst and G. A. Salt, p. 91. The use of a ' zero ' date in connexion with Beaumont warnings appears to be related to the need for about 6 generations of infections from over-wintering sources, during which a build-up of fungal material can occur. Although blight conditions were similar in 1953 and 1954, 2 sprays with a Cu fungicide increased yields by 0·5 and 2·4 tons per ac. in 1953 and '54, respectively. The cooler weather of 1954 caused the crop to mature later, and blight appeared at an earlier stage of tuber formation than in 1953.

15. Fungal diseases of cereals. By F. C. Bawden, pp. 92-3. The optimum seed-rate for wheat appeared to depend on the variety of wheat and the presence or absence of eyespot, *Cercosporella herpotrichoides*, and take-all infection in the land. Increased lodging of Proctor barley occurred with increasing seed rates and N applications. Yields of dressed grain were similar from plots sown at 1, 2 and 3 bu. per ac., but were lowered by N-application Late-sown wheat and barley were most heavily infected with *Erysiphe graminis* and yields were lowered in the unsprayed than the sprayed plots of susceptible barley varieties.

16. Fungal diseases of sugar-beet. By F. C. Bawden, pp. 94-5. Different fungicides varied in their protective effect on sugar-beet seedlings. Tissues of stored roots of beet resistant to *Botrytis cinerea* contained a fungistatic substance which was not detectable in susceptible tissues.

17. Eelworm population changes. By B. G. Peters, pp. 96-7. Manurial treatments and forms of N favouring high yields of beet tops and roots also favoured high cyst densities. At Winchester, cereal root-eelworm densities increased under barley but decreased under linseed and cocksfoot.

18. Control of wheat bulb fly. By M. J. Way and others, pp. 113-14. Spraying in March with 0·05% Parathion gave nearly 100% control.

19. Control of the bean aphid. By M. J. Way, pp. 114-16. Systox and Metasystox gave best control. Spraying with Systox increased yields of spring and autumn beans, spring beans outyielding the autumn variety.

20. Control of wireworms by insecticides. By F. Raw and C. Potter, pp. 118-19. BHC, Aldrin and Chlordane, combine-drilled, controlled wireworms and increased the yields of wheat.

21. Ley-arable experiments, pp. 149-51. The first full 6-year cycle was completed in 1954. At Highfield, addition of a further 2 cwt. nitrochalk per ac. to wheat was harmful, at Fosters it was beneficial. For the first time, wheat in a purely arable rotation did worse than wheat after leys, probably due to an increase in eyespot incidence. Barley lodged severely at Highfield owing to the wet weather and the residual fertility after old grass so that no yield was obtained; at Fosters the crop was uniformly good and no response to any of the treatments was observed.

22. Annual crop experiments, p. 151. Ten tons F.Y.M. per ac. applied to potatoes in 1953 gave an increase of 4·2 cwt. grain in the following wheat crops. Beneficial effects were also seen in wheat from 2 cwt. muriate of potash per ac., and from

3 cwt. sulphate of ammonia per ac. Potatoes responded well to F.Y.M., N and K.
23. Four-course rotation at Hoosfield. Summary of results, 1930-54, pp. 153-6. The yields in the different years after the application of fertilizers, F.Y.M., straw compost, raw straw, superphosphate and rock phosphate, are given for potatoes, barley, autumn-sown ryegrass and wheat. Beneficial effects were greatest in the year of fertilizer application. The availability of the P was of importance for potatoes. Response to mineral P could not be determined, but was probably slight.
24. Maize. By H. H. Mann, p. 169. Wisconsin 240 sown on 23 April, 4 and 12 May yielded 36, 33 and 23 cwt. dried grain per ac., respectively. The Dutch variety Goudster, sown on 4 May, yielded over 40 cwt. per ac.
25. Fodder crops for semi-acid soils. Jerusalem artichoke, "topine" strain. By H. H. Mann, pp. 159-70. This strain was on trial for the first time. It yielded 17-18·5 tons green stuff and stalks per ac. 6 months after sowing. The dry-matter content was 18·4-21·3%, crude fibre 31% and crude protein 10·4%. The tubers were being lifted in February 1955 and were expected to yield at least 8 tons per ac. This strain is considered promising for further trials.—M.P.

1513 **Sweden.** Svensk Jordbruksforskning. Årsbok 1955. [Swedish Agricultural Research. Yearbook 1955.] 1955, **11**, pp. 304.

Among papers reported are the following :
1. Potassium and calcium for peas and spring wheat. Effect on yield and composition of grain and straw. By S. L. Jansson and G. Torstensson, pp. 64-70.
2. The content of crude protein and fat in some more important varieties of white oats. By Å. Åkerman, pp. 80-4. [See Abs. 1205].
3. The constancy of tetraploids and the risk of crossing and admixture. By A. Hagberg, pp. 86-92. Rye and clover are considered.
4. Pure substances in growth-regulator herbicides. By E. Åberg, pp. 94-103. [See Abs. 1456.] —P.J.B.

1514 **Sicily.** Stazione Sperimentale di Granicoltura. Relazione sull'attività svolta nell'annata 1952-53. [Report on work during 1952-3.] By *G. Conti*. Catania, 1954, pp. 186, bibl. 24, illus.

The information given includes a summary of the work of the Station before 1952, no annual report having been published since that for 1931-2.
INVESTIGATIONS REPORTED :
1. Selection and field trials with wheat and other cereals, pp. 16-68. Wheat is grown in Sicily on 45% of the cultivated area, the varieties used being mainly of the durum type. The durum wheat Russello S.G. 7, selected at the Station, is grown on about 30,000 ha., and its area is extending. The soft wheat Florau (Florence × Aurora) is grown on about 4000 ha. Results from 3 years' varietal trials in different regions of Sicily showed the superiority, over other soft wheats, of Florau S.G. which yielded 3577 kg. of grain per ha. at Caltanisetta, of Florence × Aurora A 37 (2793 kg. per ha. at Catania) and of Est Mottin (2067 kg. per ha. on the mountains near Messina) ; of the durum wheats, the best was Eiti × Cappelli (4382 kg. of grain per ha. at Caltanisetta) followed by Azizia × Mahmoudi (3230 kg. per ha. at Enna) and Realforte × Psatas (2446 kg. per ha. at Ragusa). The oat varieties Kerokee, S.G.L., Locale Contessa, Rabat 136 and Guyra are recommended. Results from trials with many barley varieties indicated that the grain of Busulmone, Filicudi, Esastico Casale and Esastico Cowra is suitable for feeding to animals, that of Spratt, Plumage, Early, Distico 002 and Distico 004 is suitable for malting, and that of Naked 33 and Etiopico 8 D is suitable for both feeding to animals and bread-making. In sowing-date trials with several barley varieties, sowing on 15 Nov. gave significantly higher yields than sowing on 15 December.
2. Potato trials, pp. 82-8. The variety Ackersegen yielded best and was resistant to *Peronospora*.
3. Flax grown for seed with fibre as a secondary product, pp. 95-7. In varietal trials, Comune di Francia (French Common) large-seeded was best, but its fibre was coarse.
4. Cotton, pp. 113-38. For cultivation in Sicily, early and drought-resistant varieties are required. In a trial at Gela in 1951 the following varieties were outstanding : Kanno 340006, Biancavilla 3 S.G., Omega, Sigma, and Oklahoma Triumph. In trials in 1952 in 5 different localities, the variety 284 Mo Pa yielded best in 3 localities and was second in one (its yields varied from 2033 to 1179 kg. of raw fibre per ha.). Kanno (very early), Akala, Texacala, Stoneville and Deering Paula were also good varieties but appeared to be adapted to a limited area.—E.B.O.

1515 **Nigeria** Department of Agriculture. Annual Report for the year 1952-53. Part. II. Lagos. 1955, pp. 47, 9d.

INVESTIGATIONS REPORTED :
1. Sorghum, pp. 8-9 and 17. At Ilorin, an application of 60 lb. superphosphate per ac. to early maize increased the yields of the later intercropped sorghum. At Samaru, Hegari yielded best with 1733 lb. of grain per ac. The American varieties are shorter and easier to harvest than the Nigerian varieties.
2. Groundnuts, pp. 9-10, 18-19. At Kontagora, residual effects of sulphur applied in 1951 were shown by increased haulm and kernel yields of groundnuts in 1952. Various forms of sulphates increased yields at Kontagora but depressed yields

in 3 other localities. Over 4 years, Samaru 38 cropped alone or with Castle Cary (50% mixture) gave the best and the second best yields, respectively. Spacing trials indicated that the narrowest (2 ft.) ridge favoured high yields.
3. Maize, pp. 9, 11-12, 29-31. Early maize interplanted with guinea corn at Ilorin was found to require N and phosphates. At Moor Plantation, maize responded to sulphate of ammonia applications of 3 cwt. per ac. The introduced varieties Cuba Amarillo and Mexico 16 and 17 appeared almost immune to *Puccinia polysora*. Maize dusted with sulphur gave significantly higher yields than untreated plants. Later planting seriously increased the degree of rust infection.
4. Sunflower, p. 24. Grey Seeded was the heaviest yielder followed by Saturn, the best of the introduced varieties.
5. Cowpeas, pp. 31-3. Where cowpeas were intercropped with maize, the yields of each crop were nearly as great as from either crop grown alone. New Era and Mauritius were the best varieties grown alone or intercropped, but the former variety tended to be somewhat variable. At Ibadan wider spacings were favourable for early sowings of pure stands and closer spacings best for later sowings and intercropping. Results were significantly the reverse at Umuahia.—M.P.

1516 **Nigeria** Department of Agriculture. Second Annual Report of the Northern Research Station, Samaru 1953-54. Zaria, 1954, pp. 108, illus.

INVESTIGATIONS REPORTED :

1. Agronomy section. By E. J. Butler, pp. 4-17. Groundnuts, pp. 6-8. Seed which had been hand-shelled yielded better than soaked or unshelled seed. In variety and cultivation trials, Kano 50 again failed to maintain its superiority over Local Spreading. Guinea corn, pp. 8-9. *Striga senegalensis* reduced crop yields considerably. The guinea corn population was 8631 plants per ac. at germination and only 4562 per ac. at harvest, whereas the population of the parasite was 52,600 per ac. Rotation and fertilizers, pp. 9-17. At different soil-fertility levels monocropping, in contrast to rotation of crops, adversely affected guinea corn but had no effect on groundnut or cassava yields. At low fertility, cotton grew better in rotation, but at high fertility, monocropping was superior. Application of 150 lb. per ac. each of superphosphate and sulphate of ammonia to a second crop of yams or the first of 2 successive grain crops enabled a 6-year rotation to be extended satisfactorily. Groundnut cake as a fertilizer depressed the germination of groundnuts.
2. Botany section. A. R. Maurer and others, pp. 17-47. At Samaru, American sorghum varieties matured 3 months before local varieties, Hegari and Ladore being outstanding. American varieties have the drawback of ripening during the wet season. Yields from cassava cuttings increased with length of cutting, the most economical size appeared to be a 12 in. cutting. At Kano, the groundnut varieties MK 383 and 374 gave better kernel and haulm yields than Kano 50 and Local Spreading, this last variety was again satisfactory at Daura. At Yandey, Malayan and Bilomi No. 3 soyabeans were the most consistent performers and were superior to Benares and Dixie.
3. Chemistry section. By H. Irving and G. M. Higgins, pp. 47-66. Heavy applications of superphosphate were detrimental to crop yields at Kano and Yandev. Yams grown in the Ilorin Province responded significantly to sulphate of ammonia but not to superphosphate, and in two localities there was a significant N and phosphate interaction. 60 lb. sulphate of ammonia per ac. increased yam yields by approximately 100 lb. per ac. on farmers' own lands.
4. Cotton breeding section, H. E. King. pp. 67-78. The recommended sowing date for cotton is the first week of July. [See also Abs. 1381].—M.P.

1517 **Uganda Protectorate** Department of Agriculture. Record of Investigations No. 3, for the period 1st April, 1950 to 31 March, 1952. Entebbe, 1953, illus. [Received Feb. 1955]

INVESTIGATIONS REPORTED :

1. Control of blackarm disease in cotton, Serere. By J. D. Jameson and D. G. Thomas, pp. 1-10. Infection was increased by mechanical delinting, soaking the seeds in water and the use of trash in the soil. Mercuric or copper seed-dressings gave some protection against blackarm and resulting yields were higher than from the untreated control seed. Use of a non-bactericidal insecticide indicated that insects disseminate the disease amongst cotton seedlings.
2. Cotton variety testing and seed distribution. By J. D. Jameson and D. G. Thomas, pp. 10-17. The variety BP52 is being multiplied. S47, multiplied and distributed since 1948, has yielded well over a wide range of places, seasons and sowing dates, but is not very resistant to blackarm.
3. Groundnut rosette disease, Serere. By J. D. Jameson and D. G. Thomas, pp. 17-20. Spacing trials in 2 seasons confirmed that the closer spacings showed less rosette infection per unit area and that reduction in yield was due to the disease.
4. Permanent manurial experiment, Serere. By W. R. Mills pp. 34-6. Yields of sorghum and *Eleusine coracana*, but not cotton or groundnuts, were raised after applications of lime at 2 tons per ac. Farmyard manure was beneficial to all crops, and the later crops in the rotation, cotton and groundnuts, responded well to the manure applied 2 years previously.
5. A study of the soils of the no-light-heavy-

grazing experiments, Kawanda. By W. R. Mills, pp. 36-7. Cotton was used as the first indicator crop after 3 years of ley. There was no difference in soil fertility due to *Pennisetum purpureum* or *Chloris gayana*, or as a result of different grazing treatments.

6. Soil structure investigations, Kawanda. By W. R. Mills, pp. 38-9. Annual and perennial root crops did not differ in their effect on soil structure in the first year of this experiment.—M.P.

1518 **Kenya** Department of Agriculture. Annual Report for 1952. Nairobi, 1954, pp. 180. [Received March, 1955]

INVESTIGATIONS REPORTED :

1. Preliminary investigations on jute substitute fibres. By R. M. Nattrass, pp. 21-2. *Hibiscus cannabinus* ex-Kitale was the best, in retting tests, of the indigenous species, and *H. cannabinus* ex-Nigeria best of the exotic species. Other Malvaceae have been grown and are undergoing retting tests.

2. Report of the Soil Chemist. E. Bellis, pp. 24-36. Optimum, economic fertilizer rates in the Nyanza Province have been determined as being about 70 lb. per ac. each of sulphate of ammonia and 40% superphosphate. Drilling near the row before sowing had no advantage over broadcasting before sowing the cereal crop.

3. Report of the Senior Plant Breeder, H. C. Thorpe, pp. 37-60. Wheat. The varieties released from departmental control were DC × Ceres R.64 and Carleton C.I. 12064. The only variety resistant to *Puccinia graminis tritici*, forms K1-12, was R. 64. In trials at Eldoret and Njoro, 354. P.3.B.2.B yielded best and two other 354 segregates were near the top. At Ol Joro Orok, DC × Ceres and its selections, Control and R.64 headed the list. The 362 crosses yielded better at N. Kinangop. In rate-of-seeding trials, results suggest that maximum yields will be obtained with rates of about 90 lb. per ac. Barley. Top-yielder at Njoro was Plush, closely followed by Velvon, Tregal and Research ; at Eldoret, Peatland, Research, Tregal and Prior ; at Ol Joro Orok and N. Kinangop : Ray, Research, Ymer and Kenia. The variety Glacier is unsuitable for the higher areas owing to its susceptibility, to yellow ear rust, but, with Research, it is satisfactory for the light sandy loams of the Trans Nzoia. In fertilizer trials at Ol Joro Orok, yields of the variety Research were increased by applications of N and P but decreased by addition of K. Oats. The variety Lampton remains the standard for hay and feed, and Grey Algerian for milling. At Ol Joro Orok, Ajax, Achilles and Control outyielded Lampton ; at Eldoret, Tama and Control were top-yielders ; at Kitale, Lampton, R.L. 1734, Vikota and Vicland showed promise as alternatives to maize. Maize. A. S. Rhodesian hybrid, S.R.6, matured 4-6 weeks earlier and had a higher shelling percentage but a slightly lower yield than the local varieties.

4. Report of the Agricultural Officer (Experiments) Coast Province, W. R. Wright, pp. 148-62. In fertilizer trials, Dwarf Hegari sorghum as the long-rains crop and cowpeas as the short-rains crop, responded to P by giving increased yields at Shimba Hills and Matuga ; in cowpeas, the haulms, but not the seed weights, showed the response. One cwt. of double superphosphate was considered to be the most economical fertilizer application. Ridge cultivation increased grain yields of sorghum more than flat cultivation. The sorghum varieties showing promise are Birdproof, Feterita and Hegari.

5. Report of the Agricultural Officer (Experiments), Nyanza, L. J. Collings-Wells, pp. 173-80. Abundance was top-yielder in bean variety trials at Kisii and Homa Bay. Cassava : at Kakamega the varieties Alpin Valenca and F.279 yielded best in palatability tests Africans unanimously favoured Binti Minsi, the lowest yielder. Yields of " wimbi" [finger millet] and sorghum were higher from flat plots than from tied ridges. Sorghum spaced at 2 ft. × 1 ft. gave significantly higher yields than at 2 ft. × 2 ft. or 2 ft. × 4 ft.—M.P.

1519 **Tanganyika** Department of Agriculture. Annual Report for 1953. Part II. Dar es Salaam, 1954, pp. 143, illus, 6s.

INVESTIGATIONS REPORTED :

1. Ukiriguru Agricultural Station, pp. 2-10. Cotton and millet yields were higher following "tumbledown" and after grass and legume "planted fallows" than when continuously cultivated and unmanured. As in previous years, cotton from tied ridges yielded more than from untied ridges. In manurial trials, residual response increases in seed-cotton yield were 24% and 43% above the unmanured control from 7 tons of F.Y.M. per ac. and 1·5 tons cotton-seed ash per ac., respectively applied in 1944. A new cotton strain, UK.53, was constituted. In rotation trials, sorghum yielded more when grown after sorghum than after cotton.

2. Ilonga Agricultural Station, pp. 21-5. Trials indicated that maize planted on the flat tended to become laid more easily than that planted on the ridge. White Katumbili maize was found to be very adaptable to local climatic and cultivation conditions. Three types of mechanical ploughing of maize each proved superior in their effects to hand cultivation. Sorghum yields were higher from 7 in. than from 14 or 28 in. drill rows at either 6 or 12 lb. seed per ac. Reduction in head size was significant only at the closest spacing and heaviest seed rate. Other crops under observation were kudzu, lucerne, velvet bean and *Panicum miliaceum*.

3. Sisal Research Station, Mlingano, Ngomeni, pp. 39-54. As in previous years, intercropping with sorghum resulted in depressed sisal fibre yields, but maize and beans had no effect.

4. Report of the Entomologist, Morogoro, pp. 55-9. Grain storage. [See Abs. 440.]

5. Report of the Entomologist, Arusha, pp. 66-70. In the Mbulu district it was confirmed that maize-trash bunds are an important carry-over site for maize stalk borers (*Busseola fusca*).
6. Report of the Botanist, Ukiriguru, pp. 78-83. In sorghum variety trials Dobbs maintained its yield superiority; B.C.27 also yielded satisfactorily. Dobbs had significantly fewer *Striga* plants than other varieties.
7. Soil Conservation Service, Tengeru, pp. 100-10. Maize yields were highest from bench terraces at 6 ft. and 3 ft. vertical intervals. Maize grown on Matengo pits (pits containing weeds and plant refuse) yielded more than when grown on ridges or terraces. There was a significant interaction effect between spacing and conservation treatment on yields. Mulch applied just before sowing maize depressed yields.
8. Report of the Agricultural Officer, Iringa, pp. 111-14. The best wheat varieties in trials in the Iringa district were 44/W/1 below, and 291J111 above, 6300 ft., and in the Mbeya district they were 44/W/34 and 341F2D2, respectively. The South African 44/W/34 variety yielded very well, equivalent to 29 cwt. per ac. From fertilizer trials with barley it was concluded that phosphates are essential on the sandy Iringa soils.
9. Report of the Officer-in-charge, Lupiro Food Farm, pp. 128-9. Rice plots fertilized with superphosphate gave higher yields and the plants survived the drought better than untreated controls.
10. Morogoro Farm Report, p. 131. Promising, high-yielding dwarf sorghum selections were Tada and Double Dwarf Early Shallu.
11. Mahiwa Experimental Station, pp. 133-4. In a rotation experiment, cassia loppings puddled-in prior to planting rice each year resulted in significantly higher rice yields than rice grown continuously; farmyard manure increased rice yields more than did artificial fertilizers.
12. Experiments in the Northern Province, pp. 138-42. The application of 80 lb. muriate of potash per ac. to maize in the Arusha district increased crop yields by 17%. In irrigation trials in the Moshi district, cotton gave significantly increased yields with all rates of additional water. Maize had more specific requirements. The results indicated that 1 cusec [1 cusec = 1 cu. ft. per sec.] could irrigate 150 ac. of cotton and 100 ac. of maize in this district. A reclamation trial of saline soil, with rice as the test-crop, showed that considerable soil reclamation was obtained with leaching alone, after flooding and irrigation.—M.P.

1520 **Nyasaland Protectorate** Department of Agriculture. Annual Report for the year 1953/54. Pt. II. Zomba, 1954, pp. 64, 4s. 6d.

INVESTIGATIONS REPORTED:

1. Maize, pp. 3-8. Southern Rhodesian hybrids yielded better than local varieties but were more susceptible to attack by *Puccinia* spp. [See Abs. 74]. The local variety Namalenga did well. Increased yields were obtained by: (a) applications of 5 tons each of farmyard and kraal manure per ac.; (b) sowing early, at the beginning of December; (c) weeding at the optimum time [date not given]; (d) splitting existing ridges, instead of scraping up old ridges or digging between ridges.
2. Cereals, pp. 8-10. The most reliable wheat varieties were 184, 294, and 318. The rice variety 0/602 ex-Shindano yielded best at Chilwa with 6340 lb. paddy per ac.
3. Groundnuts, pp. 2-12. Delayed sowing, after late November, and delayed harvesting of the variety Spanish Bunch reduced yields appreciably. With 12 in. spacing in the row, 3 rows per ridge gave higher yields than 2 rows per ridge. Perenox, at 6 lb. in 100 gal. of water per ac. effectively reduced the incidence of *Cercospora* leaf spot in the first 6 weeks of growth.
4. Sunflowers, p. 12. The varieties Kampala White and Kampala yielded well at Chitedze and Tuchila; Giant Black was the most consistent of the black-seeded types.
5. Soyabeans, p. 12. Hernon 279, with 944 lb. threshed seed per ac., was the highest yielder at Chitedze and Peruvian Yellow, with 1422 lb. per ac., at Bvumbwe.
6. Cowpeas, p. 13. The variety Turiana sown on 10 December, yielded 956 lb. per ac., and when sown on 8 January, only 63 lb. per ac.
7. Cotton, pp. 44-50. [See Abs. 1000].—M.P.

1521 **Basutoland** Department of Agriculture. Annual Report for 1954. Maseru, [n.d.], pp. 76, illus. [Received April, 1955]

In long-term experiments on the effect of NPK and lime on maize, sorghum and wheat yields, phosphate deficiency was evident as a factor limiting production, but when more than 25 lb. P_2O_5 per ac. were applied the response curves began to flatten sharply. A 50 : 50 mixture of raw rock phosphate and superphosphate was as efficient a fertilizer on acid soils as superphosphate alone. Liming raised maize yields on all red ferrugineous soils.—M.P.

1522 **India.** Indian Council of Agricultural Research. Annual Report for 1952-3. New Delhi, 1954, pp. 189.

INVESTIGATIONS REPORTED:

1. Manurial trials with rice, pp. 6-7. In Madras, optimum yields were obtained by manuring with ammonium sulphate at the rate 30 lb. N per ac. combined with 4000-5000 lb. green manure per ac. In West Bengal, the application of ammonium sulphate at 25 lb. N per ac. was profitable.
2. Pre-sowing hardening treatment of wheat seeds, pp. 11-13. Hardening treatment of wheat seeds, before sowing, with distilled water, and 0·1 M and 0·05 M solutions of zinc chloride,

manganese sulphate, copper sulphate and sodium borate, hastened germination and the rate of seedling growth. Treated seed absorbed more moisture than untreated seed. When sown in soils with a low moisture content, crops from the treated seed gave greater yields (up to 25% greater) than those from untreated seed.

3. Outstanding strains of *Paspalum scrobiculatum*, p. 30.

4. Maize varieties, pp. 30-3. Varietal trials with maize at New Delhi and in Punjab, Uttar Pradesh, Bihar, Hyderabad, Rajasthan, and West Bengal are described.—W.J.B.

1523 **India.** Indian Central Jute Committee (Jute Agricultural Research Institute). Annual Report, 1953-4. Calcutta, 1955, pp. 145.

Viability of seeds collected from capsules at different stages of maturity pp. 31-3. Seeds of the variety 040-632 from green, half-matured and fully-matured capsules had 26, 76 and 83% percent viability, respectively. Comparable figures for the varieties D154 and C.G. were : 69, 94 and 93 and 45, 82 and 86%.—W.J.B.

1524 **Australia.** Queensland Department of Agriculture and Stock. Annual Report for the year 1953-54. Brisbane, 1954, pp. 109, illus. [Received Feb., 1955]

INVESTIGATIONS REPORTED :

1. Crop varietal trials. By J. W. S. Sloan, pp. 33-5. With maize under irrigation, Queensland hybrids yielded better than open-pollinated varieties. The cotton variety Coker 100 yielded best with over 1500 lb. seed-cotton per ac.

2. Bureau of Tropical Agriculture. By J. W. Sloan, p. 39. Kenaf [*Hibiscus* spp.] planted in November-December yielded more fibre than that planted in January-February.

3. Regional Experiment Stations. By W. G. Wells, pp. 41-5. Hermitage. Quick-maturing varieties of wheat, Fedweb 5, Gabo and Spica, yielded better than the slow-maturing varieties Celebration, Charter and Festival. The grain sorghum variety Alpha yielded 50 bu. per ac., and Caprock 39 bu. per ac. Jupiter sunflower yielded best with 617 lb. per ac. and Giant Russian 576 lb. per ac. Biloela. A shorter, smaller-headed variety of Giant Russian sunflower was top yielder with 676 lb. per ac. Nanda soyabean yielded well in several localities and was found most suitable for mechanical harvesting ; the variety Clemson showed best resistance to bacterial leaf spot. Ayr. Sowing cotton in March, as soon as possible after the wet season, increased the chances of obtaining good yields. The long-season Queensland maize hybrids Q 431 and Q 692 yielded 99 bu. per ac. when sown in mid-March ; for later sowings dressings of sulphate of ammonia were found necessary. Kalo outyielded 4 other varieties of grain sorghum. In a row- and plant-spacing trial with Jupiter sunflower, best yields were obtained from spacing the plants 12 in. apart and 18 in. between rows, the resulting stand being most suitable for mechanical harvesting. The early wheat variety, Pusa 4, was best. Kairi Vicland oats yielded 3 tons hay per ac., Bovah was also a suitable oat for grazing.—M.P.

BOOKS

1525 SPRAGUE, G. F. [Ed]. **Corn and corn improvement. Agronomy. Volume 5. A series of monographs prepared under the auspices of the American Society of Agronomy.** 1955, pp. xiv + 699, bibl. at end of chaps., illus., New York ; Acad. Press, Inc., 23 × 15 cm., $11·50.

Agricultural scientists will turn eagerly to this book for two reasons. Firstly, there is no up-to-date text-book on maize available ; secondly, the development of hybrid maize in the USA is one of the greatest achievements of modern agriculture.

Approached from these two points of view, the book is more satisfying from the second than the first. A long chapter by M. M. Rhoades on the cytogenetics of maize will be valuable to the specialist, but goes a little deep for those whose genetics and cytology are rusty. The editor's chapter on maize breeding is one of the best in the book and brings lucidity to the long and complicated story of hybrid maize production. A mass of extremely involved data is handled with clarity and precision. The problems faced by the breeders are formidable : a mere 10 inbred lines can be combined to produce 45 single, or 630 double, crosses ; " Student " has estimated that the oil content of maize seed alone is conditioned by 20-40 genes. Testing the lines evolved is as complicated as producing them ; there is still no general agreement on the interpretation of heterosis. A clear definition is given of " synthetic varieties," which may be useful in some non-American, particularly tropical, environments. The writer does not accept that a ceiling has yet been reached for hybrid yields. This chapter is followed most appropriately by one on the production of hybrid seed written by J. M. Airy, who, being associated with one of the companies concerned with this, gives a fascinating account of their problems.

From the other aspect, the production and growth of the crop, the most important contribution is by G. H. Stringfield on " Corn Culture."

This brilliant summary of the subject is all too short. Nevertheless, the author contrives to throw out many suggestive ideas—such as, that many experimental results have been vitiated because the stands were not dense enough to give full expression to high-yielding potentials. He makes the interesting remark that over-large ears in maize are a sign of too low a plant population.

Most of the remaining chapters are on more routine subjects, though none the less competently handled for that. From Chapter I on the history of maize, we learn that the theory of origin advanced by Mangelsdorf and Reeves no longer holds the field as it did ten years ago. Other contributions deal with the morphology, mineral nutrition, and climatic requirements of the plant ; popcorn and sweet-corn as separate issues ; diseases, pests, industrial utilization, and nutritive value of maize.

The book so far makes no attempt to go outside the U.S.A. for its data, or even (with very rare exceptions) for its bibliographical references. Indeed, the criticism might be made that even within this limitation too many of the data come from the northern part of the country, where certainly the "corn belt" lies, but by no means the whole of the crop is grown. More reference to conditions in the southern states would have made the book more valuable to readers concerned with the warm regions where most non-American maize is grown. The attempt to cover world conditions of maize-growing is confined to a final chapter of only nine pages by the editor, and the only one in the book to which no bibliography is appended. The problems of other countries, such as the outbreaks of *Puccinia polysora* in Africa in recent years, are not always realised. It should be noted, however, that the map showing the world distribution of the crop is rather more accurate than some that have been published elsewhere.

It is as an account of the American maize-breeding achievement that the book will immediately take its place as a standard work of reference, particularly for plant breeders. On this aspect, its lucid treatment of an enormous number of complicated facts could hardly have been bettered. Overlapping between, or omissions by, different contributing authors have been more successfully avoided than is usually the case in co-operative publications.—G. B. Masefield.

1526 Grist, D. H. **Rice.** 2nd edn, 1955, pp. 333, bibl., illus., London ; Longmans, Green and Co., 21 × 14 cm., 35s.

The first edition of this book was reviewed in *Fld Crop Abstr.* 7 : 321. This second edition incorporates many minor suggestions and corrections contributed by reviewers and correspondents. The number of references in the bibliography has been expanded from 289 to 305.—W. J. Baulkwill.

1527 England and Wales Ministry of Agriculture and Fisheries. **A survey of the agriculture of the sand lands in districts of low rainfall.** *Bull. 163. England and Wales Minist. Agric. Fish.* 1954, pp. vi + 49, 2s. 6d.

One of the most interesting, and potentially one of the most important, recent publications of the Ministry of Agriculture and Fisheries is devoted to a consideration of the sandy lands of the eastern half of England and their problems, that is to say of that part of the country which has a rainfall of less than 29 inches per annum.

The extent of such lands is very much greater than is usually realised. Though no estimate is made of their actual area, it is clear that quite a considerable part of the agricultural land in the eastern and east midland counties is of this character. Attention has not been generally focussed on them possibly for two reasons. Firstly, they have been often looked upon as relatively poor and in many cases little better than heaths. Many of them have actually remained heaths except under conditions of national stress such as during the first and second world wars. Secondly, most of the experimental work in connexion with agriculture has been done on heavier, and possibly more fruitful, land, There are, of course, exceptions to this. Woburn is on the Lower Greensand of Bedfordshire, and Tunstall is on the very poor sandy areas of east Suffolk.

Yet, in spite of the public neglect of the problems of these lands, many of them have been developed intensively and have been the seat of some of the most successful market-garden cultivation in the country, e.g. in the Biggleswade area of east Bedfordshire and the Selby and Doncaster region of Yorkshire. Where the peculiar needs of such sand lands have been realised and met, either by large- or small-holders, they have responded well and very successful practices have followed. So much is this the case that I have seen, lying side by side, fields considered as suitable only for pine forest, and similar soils bearing large and very profitable garden crops under a rainfall of about 24 inches per annum.

One cannot help feeling, as is stated in the final paragraphs of this bulletin, that 'given a proper understanding of the problems of such lands' sufficient knowledge and experience is already available to make farming successful in many areas at present uncultivated or cultivated at far too low a standard. Many of the problems which face the man who wishes to cultivate these sandy areas, and which are at least partially solved for each region, are set out in the careful descriptions of the districts covered by this survey. But there are a good many additional problems which demand investigation if the best results are to be obtained from the sandy lands of Great Britain. These are

set out in fair detail and will be of great value to those who are concerned with the development of these areas. There still remain, however, a good many matters on which much further information is required if the best is to be made of the large areas of land available.

Of these problems, two seem to occur in almost every region. The first is the general acidity of the sandy lands. This has been met, and must usually be met, by the free use of lime, in one form or another. In the much more general application of chalk or even of magnesian limestone in the years since the last war it almost seems as if we were reverting to practices such as marling which were common in earlier times. I am not sure, however, whether enough stress is laid in this bulletin on the possibility of the use of acid-loving plants especially for fodder, such as sweet-lupins (which have proved a considerable success in east Suffolk), serradella, or even birdsfoot trefoil, which grows where clover would only give a very poor crop.

The second problem which occurs everywhere is that of retaining moisture in such soils as these which are very liable to suffer from the droughts so common in the eastern counties. It seems certain that the main effort in this direction must be to increase the organic matter in the soil by one means or another. How is this to be accomplished ? And what other effects will a mere increase of organic matter, irrespective of its character, have on the growth of crops ? Further, how rapidly will added organic matter disappear from soils under various methods of farming ? All these questions are very germane to the present situation. With the reduction in the amount of animal manure available for application to the sandy lands, (and I imagine that not more than one-third the quantity that could be obtained fifty years ago is now available, and at an almost impossible price) other methods of adding organic matter have been widely recommended and widely used, with varying results. Green manuring, which usually involves the sacrifice of any return from the land for at least half a season, has had only a very limited success in this country and I am not certain whether the best method of using it has yet been found. The use of leys undoubtedly increases the organic matter in sandy soils, but whether the grazing obtained during the ley period compensates for the sacrifice of crop returns is still a moot point. The use of composts, made with farm refuse and sewage or similar materials would seem to have only a limited application. Thus, the study of how best to increase the organic matter in sandy soils under the present conditions is an urgent matter and I would commend the outline of what we want to know, set out on page 3 of the bulletin, to all those who have to deal with the sand lands of eastern England.—H. H. Mann.

1528 England and Wales Ministry of Agriculture and Fisheries. **Farm grain drying and storage.** *Bull. 149. England and Wales Minist. Agric. Fish.* 1954, pp. 121, illus., 5s

This bulletin is intended for both agricultural advisers and farmers. It gives information derived from experimental work and practical experience, on : principles of grain drying and storage ; choice of combine for a particular farm ; choice of drying system and planning of installations ; structures required for drying, storing and handling grain ; pest control during storage.—E. Biasutti Owen.

1529† Leopold, A. C. **Auxins and plant growth.** 1955, pp. 354, bibl. 781, illus., California Univ Press, 24 × 16 cm., $5.

A. C. Leopold, who in recent years has come into prominence among American plant physiologists, has added yet another book to the already extensive library on plant growth substances. He has aimed at presenting an up-to-date exposition of the science and application of growth regulators, intended mainly for graduate students and research workers. Well over half the book is devoted to fundamental aspects of auxin action, including such topics as the occurrence and chemical nature of auxins and their various effects on plants. A valuable feature of this section is a description of methods of extraction, and, in particular, of physical, chemical and biological techniques of auxin assay. Much of this information has previously been scattered in the literature and is now made available in a summarized form. The second and slightly shorter part of the book deals with the application of growth substances in agriculture, but, here also, the emphasis lies distinctly on the scientific basis rather than on the technological implications for field practice. For example, the chapter on herbicides, which occupies some 20 pages, is divided into the following sections : physiological basis of herbicidal action ; factors in susceptibility ; factors in selectivity ; selection of auxins, and factors in success. The author is clearly convinced that the use of growth substances requires some basic knowledge on the part of the practitioner. No book is free from defects, and on the debit side there is the somewhat tiring repetitive style of the author. There is also a certain tendency to present tentative suggestions as accepted facts, as, for instance, in the section dealing with the biochemistry of indoleacetic acid formation. The bibliography of some 32 pages is extremely useful, and, on the whole, representative. The annoying practice of quoting references to the literature at the end of each chapter has also been avoided. The book is well produced and clearly printed and should be of considerable value to students, research workers, and technologists with an enquiring mind.—R. H. M. Langer.

1530 Arnon, D. I. [Ed.] **Annual review of plant physiology. Vol. 6.** 1955, pp. 505, Stanford, Calif. ; Annual Reviews, Inc., 23 × 16 cm.

Among papers presented in this volume are the following :

1. Redistribution of mineral elements during development. By R. F. Williams, pp. 25-42, bibl. 59.
2. Nitrogen metabolism. By G. C. Webster, pp. 43-70, bibl. 148.
3. Functional aspects in mineral nutrition of green plants. By A. Pirson, pp. 71-114.
4. Effect of ecological factors on photosynthesis. By M. D. Thomas, pp. 135-56, bibl. 69.
5. Chemical constitution as related to growth regulator action. By R. M. Muir and C. Hansch, pp. 157-76, bibl. 74.
6. The physiology of flowering. By J. L. Liverman, pp. 177-210, bibl. 144.
7. The physiology of abscission. By F. T. Addicott and Ruth S. Lynch, pp. 211-38, bibl. 148.
8. The water economy and the hydrature of plants. By H. Walter, pp. 239-52, bibl. 50.
9. Physiology of the cotton plant. By F. M. Eaton, pp. 299-328, bibl. 126.—P. J. Boyle.

1531 Brouwer, W. and Stählin, A. Handbuch der Samenkunde. [**The seed handbook.**] 1955, pp. 664, bibl. 67, illus., Frankfurt/Main ; DLG-Verlags-GmbH, 25 × 18 cm., DM 96·40.

The book provides detailed information on the morphological characters of the fruits and seeds of agricultural, horticultural and forestry plants and of the seeds of agricultural weeds. Following a general introductory chapter on the fruits and seeds of angiosperms and gymnosperms, those of 2512 plants are treated individually. For each there is a brief, but exact, description of the seed in the mature state, also notes on habitat and geographical distribution. For illustrations, of which there are 1672, hand drawings were preferred to photographs, in order to bring out the fine details more clearly. The arrangement of the plants is alphabetical, both as regards families and genera within families. With a thought for the use of the book outside Germany, English names are given [where applicable] in addition to the botanical and German names, and all three are incorporated in the index of plant names. The identification key is limited to seeds of the most important agricultural plants (excluding well-known cereals) and their associated weeds. The primary grouping is by size and shape of seed.

The book is the product of many years of seed collection and subsequent work, and it claims to be the only large book on seed identification [in German].—D. Brown.

1532 Institut National pour l'Étude Agronomique du Congo Belge [INÉAC]. Flore du Congo belge et du Ruanda-Urundi. Spermatophytes. [**Flora of the Belgian Congo and Ruanda-Urundi. Volume 6, Spermatophytes.**] 1954, pp. 426, illus., Bruxelles ; 25 × 16 cm., 300 fr.

[See *Fld Crop Abstr.* 8 : 341.] The sixth volume of this work deals with 3 tribes of the Papilionatae : Dalbergieae, Vicieae and Phaseoleae. Each chapter includes descriptions of the genera and species, as well as keys to the identification of subordinate groups and notes on distribution, habitat, etc. Amongst the Vicieae are the genera *Lathyrus* and *Vicia* ; and amongst the Phaseoleae the genera *Glycine, Mucuna, Canavalia, Eriosema, Centrosema, Dolichos, Phaseolus, Vigna* and *Adenodolichos*, and the species *Cajanus cajan, Lablab niger* and *Voandzeia subterranea*. There are indexes of scientific and of vernacular names.—E. B. Owen.

1533 Peru Programa Cooperativo de Experimentacion Agropecuaria. Diccionario de plantas cultivadas, hierbas silvestres y malas hierbas en el Perú. Equivalentes en espanol, ingles y latin. [**Dictionary of cultivated, wild and weed plants of Peru. English, Spanish and Latin equivalents.**] 2nd edn 1954, pp. 56, Lima, Peru ; P.C.E.A., 22 × 17 cm.

The dictionary is divided into 3 parts ; Spanish-English-Latin, English-Spanish-Latin, and Latin-English-Spanish.—W. J. Baulkwill.

NEWS ITEMS AND SCIENTIFIC NOTES

Great Britain

1534 Selected Seed. The increase in yields per acre by the adoption of improved agricultural practices and the use of selected seed (to which the higher world output of grain since before the war is mainly due) has been striking in certain countries of the Commonwealth. Output per acre of Canadian wheat is now one-third above the long-term pre-war average, and yields in Australia, although below those in Canada, have increased by nearly one-half since before the war ; in the United Kingdom, the average yield for wheat has been raised over the period by over one-fifth and that for barley by nearly one-quarter, although the yields achieved in Denmark, which are the highest in the world, have not been equalled. *The Times* 10 August, 1955.—c.l.s.

1535 Potatoes. Attention is now being given by the Department of Scientific and Industrial Research to quality

in potatoes. The gross output from farms in the United Kingdom is worth about £70 m. annually, and the potato is one of the staple home-produced food products. The potato can be a delicately flavoured and appetizing food, but many reaching the consumer are not of this high standard. The reason for differences in quality is being sought along lines similar to those which have been developed with fish, i.e. palate assessment of quality will be progressively related to such variables as season, soil and variety and finally to objective chemical and physical criteria. This is a long-range programme, but it will, if possible, be desirable to associate with it from the outset the interest both of the producer and of the consumer. *Rep. Fd Invest. Bd DSIR* 1954.—C.L.S.

1536† Botanical Research Centre. A new botanical research centre is being set up in London near Lord's cricket ground. The Nuffield Foundation has given the building to University College for botanical research, together with grants totalling £30,000 for equipment. Glasshouses and a laboratory have already been put up, and a " phytotron "—a building of many compartments in which any required climatic conditions can be produced—is under construction. *Grower* 9 July, 1955.—C.L.S.

1537 Association of Applied Biologists. The Jubilee Meeting of this Association was held in London on 13-17 September, 1954; the proceedings are recorded in the *Annals of Applied Biology* Vol. 42, February, 1955. The contents of this issue (mostly of a review nature) are classified under headings which include: international co-operation in the field of crop protection; insect pests of stored products; plant growth-regulating substances; education and extension services in applied biology. The following discourses are also included: the changing problems of applied biology, by Sir E. John Russell; the contribution of pure science to applied biology, by V. B. Wigglesworth; research trends in Canadian agriculture and forestry, by K. W. Neatby.—M.H.

1538† The New British Museum Law. The new British Museum Bill which passed its third reading in the House of Lords on 27 April has become law. " Its main purpose is to render it possible for objects in the Collection of the Natural History Museum to be lent abroad for research purposes." *Nature, Lond.* 21 May, 1955.—M.H.

Italy

1539 New Wheat Variety Loro, which is causing interest and controversy in Italy, originated from a remarkable ear which was noticed by a farmer in a field of the wheat variety Fortunato growing near Bologna in June, 1951. The farmer sowed the seed from this ear on his farm in Padova Province. The plants obtained, and subsequent multiplications, showed new, stable characters. The best ears of this variety, which was named after the farmer, contain about 100 well-formed grains. The weight of 1000 grains is 49 g. On soil of medium fertility, the grain yield (13% moisture) was 5940 kg. per ha, and the hectolitre weight 80 kg. It is thought that this variety originated from the genetical material of the Institute for Cereal Breeding at Bologna. Some seeds from this material were probably present as an impurity in the seed of Fortunato. The seed of Loro will soon be available for distribution. *G. Agric. Domen.* 1955, No. 26 and 27.—E.B.O.

Australia

1540† Merrindale Biological Research Station, Croydon, Victoria, has been established by Imperial Chemical Industries of Australia and New Zealand. Its work will include research into plant pests and diseases, weed control, and the control of animal diseases. *J. Aust. Inst. agric. Res.* June, 1955.—M.P.

1541† Rain-making Trials. The first large-area experimental seeding of clouds with silver iodide, took place in the Cloncurry district of Queensland in early December 1954. Rainfall records have been analysed and, according to the C.S.I.R.O., the experiments were inconclusive. *Past. Rev.* June, 1955.—M.P.

U.S.A.

1542 New Herbicide. The release of a new herbicide by the Geigy Chemical Company, USA, is reported. This is 2-chloro-4,6-*bis* (diethylamino)-*S*-triazine (Geigy 444), which is reported to have promise as a non-selective, post-emergence herbicide for use on such crops as ryegrass, oats, beans, peas, cotton and sweet-corn. *J. agric. fd Chem.* March, 1955.—P.J.B.

1543 Three New Herbicides. Work carried out by Monsanto Chemicals, Inc. (USA) on the synthesis of aliphatic *N*-substituted chloroacetamides has resulted in the production of 3 new herbicides. These are: α-chloro-*N*,*N*-diallylacetamide (CDAA), α-chloro-*N*,*N*-diethylacetamide (CDEA) and 2-chloroallyl diethyldithio carbamate (CDEC). CDAA and CDEA are reported to have given excellent control of grasses at rates of 3-6 lb. per ac. Used as pre-emergence treatments, these herbicides controlled *Setaria* sp., *Avena* sp., *Bromus tectorum* and *Digitaria* sp. and also certain broad-leaved weeds in maize and soyabeans; no detrimental effects on the crop species were noted. CDEC is reported to be similar to CDAA and CDEA in its activity. *J. agric. fd Chem.* May 1955.—P.J.B.

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